

In This Issue—*Shooting Electrical Troubles*

MOTOR AGE

Volume XXXVI
Number 16

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, OCTOBER 16, 1919

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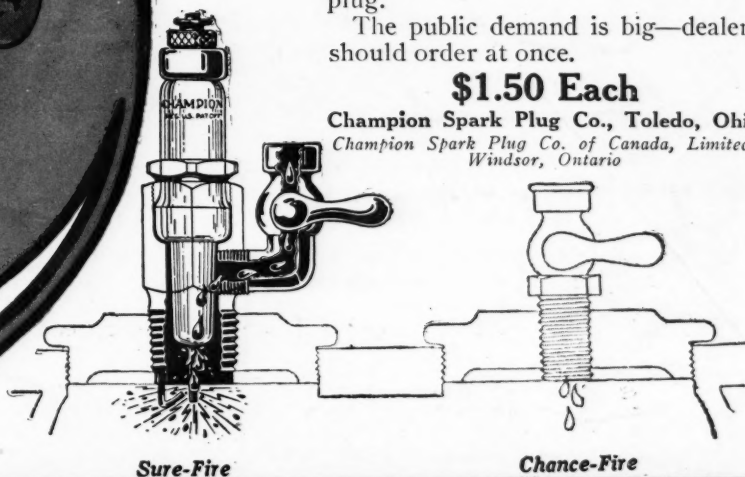
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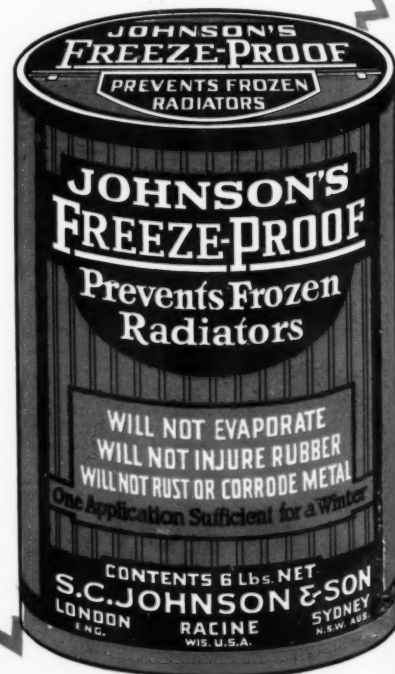
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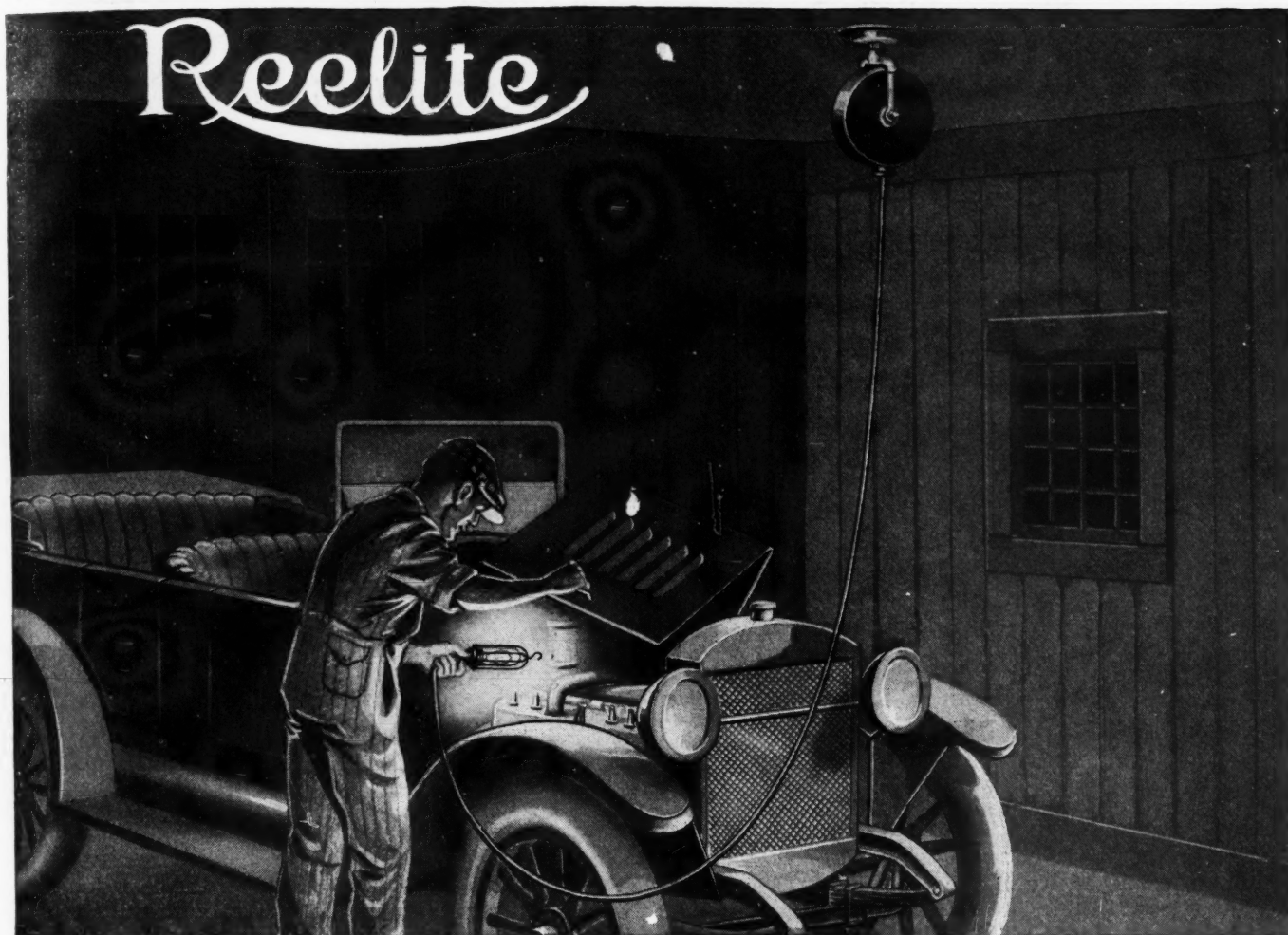
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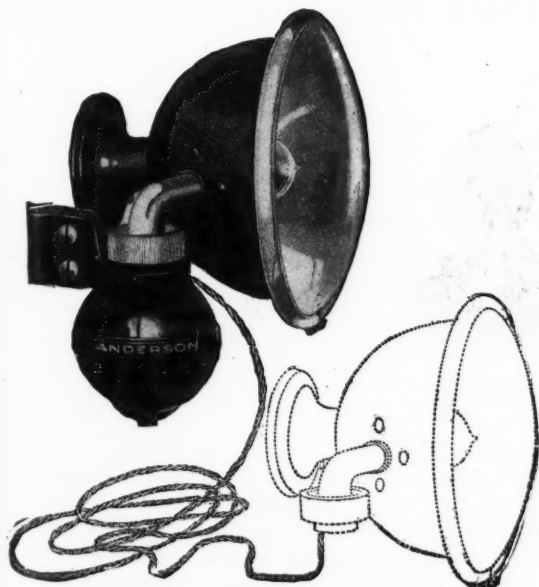
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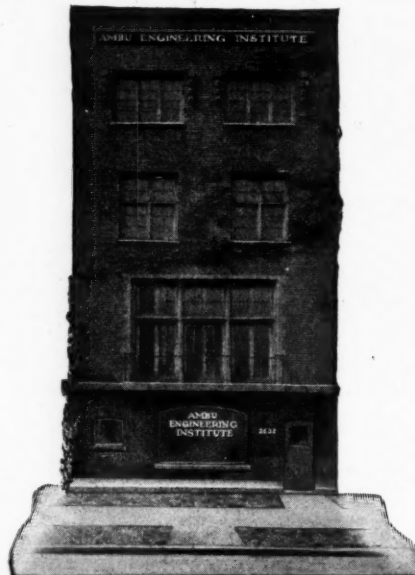
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The Automotive Industry has long been waiting for an institute where instruction in all the phases of automotive electricity may be obtained. The Ambu Engineering Institute, conducted under the direction of the American Bureau of Engineering, fills this long felt want. The first class has started with full enrollment of students. That this class includes men from Montana, Florida, Michigan, Oklahoma, Washington and Illinois, is concrete evidence of the national scope of the Institute. New classes limited to twenty men start every other Monday. As these classes are filling up rapidly it is advisable for those desiring to take this course to make class reservations early.

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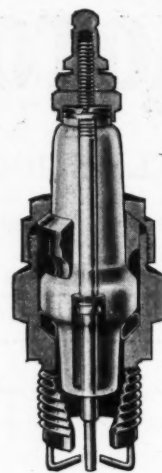
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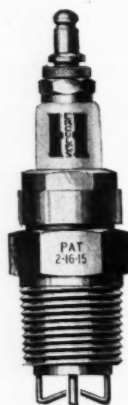
Highly recommended for old model Fords and Overlands and all Reo models, both pleasure and commercial.



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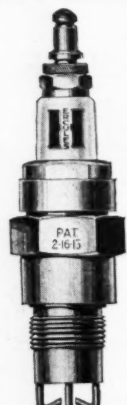
3/4 inch long body. The long shell above the thread eliminates the need for socket wrench.

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WE HAVE WITH US THIS WEEK—

A little more concrete maintenance information in the form of "Shooting Electrical Troubles." This is a subject in which all of us should be interested, for who hasn't occasion to do some "fixing" of batteries, wires, generators, etc., at some time or other? The lead story in this number is one of several articles on the practical phases of locating and repairing electrical troubles. Read this and those to follow so you'll know what methods to follow in locating your electrical troubles and repairing them.

FAREWELL, FORD DISTRIBUTORS!

It seems to be the tendency in the tractor industry to do away with distributing organizations. Now comes the Fordson with the notice that their product will be sold direct to dealers excepting where the Fordson is sold through their own branch distributing organization. This is about the most interesting news this week and you should read it to keep abreast of the new developments taking place in your trade and industry.

NEW CARS—NEW MODELS

Perhaps you've noticed that MOTOR AGE is again able to present you with some real information about new cars and new models. Last week we described three and this number contains descriptions and illustrations of two more—the Grant and Spacke—as well as the Avery cultivator. Other descriptions will follow regularly from now on.

AIR RACES—AUTO RACES

Although it may be some time before we scramble to get an agency for a flyer, that's no reason why we should not keep in touch with the big stunts that are being pulled off in the air these days. The latest developments in the Trans-Continental Air Race are told about in this number.

And, of course, we can't forget the home of the "Cincinnati Reds," so you'll find the results of their big auto race last Sunday in this number.



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MOTOR AGE



SHOOTING ELECTRICAL TROUBLES

Quick and Accurate Methods of Locating and Correcting Derangements of Starting, Lighting and Ignition Systems

The reputation of a service station or repair shop often hinges on how quickly and accurately the "bugs" in an electrical system are found and remedied. In this article and the ones to follow are given short and easy methods for shooting common electrical troubles.

Next Week—Testing Out Complete Circuits.
October 30—The Secret of Good Connections.
November 6—How To Read Wiring Diagrams.

IN USUAL electrical troubles, the main thing is a quick and correct diagnosis. The trouble may be in any of the major parts of the system or it may be in the wiring. The nature of the trouble often partly locates it, at least approximately. For instance, if a single lamp will not burn, the trouble must be either in the bulb, socket or wiring of that lamp. It cannot be in the battery, the generator or the appurtenances of the generating system, because any fault in these parts would affect all the lamps alike. Similarly, if the starting motor refuses to crank the engine, the trouble—if the engine can be turned by hand—may be in the starter, its wiring, the switch, the battery or the generating system. If the lamps burn properly, the trouble is not with the battery or generating system, and this test, therefore, limits the necessary search to the starter, the switch and the wiring.

To diagnose electrical troubles properly, it is necessary to have a certain number of testing instruments. For battery tester's the most important is the battery hydrometer, Fig. 1. For convenience in battery testing, the hydrometer generally is placed inside a syringe or siphon by which a certain amount of electrolyte can be withdrawn quickly from each cell of the battery and



as quickly restored. The syringe consists of a substantially cylindrical glass vessel with a spout at the bottom for insertion into the battery filling hole and a rubber bulb at the top. By compressing this bulb, then inserting the spout into the battery cell below the level of the electrolyte and then releasing the bulb, sufficient electrolyte can be drawn into the syringe to float the hydrometer. The latter is an instrument for determining the specific gravity of a liquid. It is based on the physical law that a floating body displaces as much liquid as is equal to its own weight. As the hydrometer has a definite weight, if the liquid in which it is immersed is relatively light, it will sink into it to a greater depth, thus displacing a greater volume of it than if the liquid is relatively heavy.

The stem of the hydrometer is graduated to show the specific gravity of the liquid in which it is immersed, at the level of the liquid. Pure water has a specific gravity of 1.000 and pure sulphuric acid has a specific gravity of about 1.85. The extreme



Fig. 1—Battery hydrometer

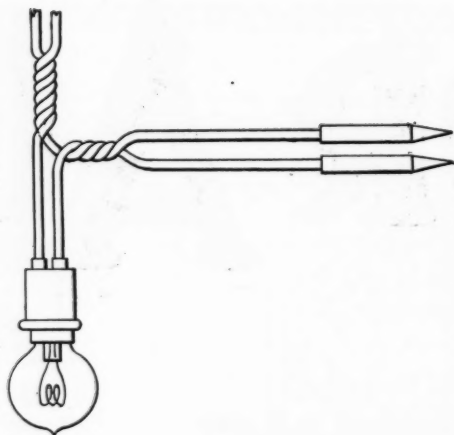


Fig. 2—Arrangement of testing lamp

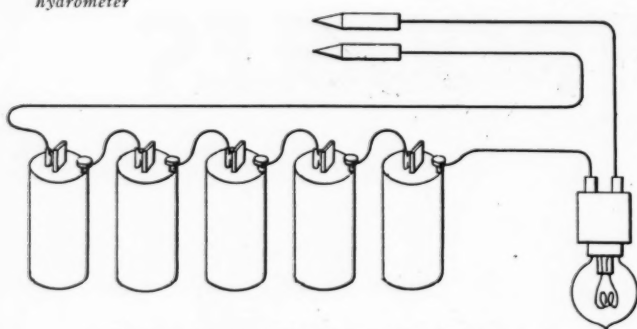


Fig. 3—Arrangement of low-voltage testing lamp

range of specific gravity of storage battery electrolyte is about 1.100 to 1.3000. As the charge in the battery increases during the process of charging, the density of the electrolyte increases, and vice versa, as the charge decreases during the process of discharge, the density of the electrolyte decreases. At full charge the density of the electrolyte is about 1.280, and when a battery is completely discharged, the density is about 1.120. When the density is midway between these figures, the battery contains a half charge.

The simplest indication of a current flowing in a circuit is a spark obtained on breaking the circuit at any point. A storage battery has little internal resistance and the current from it usually is sufficiently intense to give a clearly visible spark when the circuit is broken. This method can be applied in various ways to determine whether or not a circuit is faulty.

Ammeter and Voltmeter

An ammeter and a voltmeter are handy instruments for tracing electrical troubles. Reasonably accurate instruments can be purchased now at comparatively low prices and in the hands of a man with some electrical knowledge are a great help. For instance, with every system of electrical equipment the charging current at certain engine speeds should have a certain value. Therefore, an ammeter test of the charging current at a given engine speed would show whether or not an electric charging system is operating as it should.

It may here be explained that an ammeter, or ampere-meter, shows the quantity of current in amperes flowing in a circuit, while a voltmeter shows the electrical pressure between the points to which the voltmeter is connected. An ammeter is perhaps of wider use in diagnosing troubles than a voltmeter. To be able to properly use these instruments, the operator has to be familiar with their method of connection. To measure the current flowing in any circuit, the circuit is opened at any point and the ammeter is inserted at the break. On the other hand, if it is desired to determine the voltage active in the circuit, the voltmeter must be connected differently. The highest measurable voltage in a

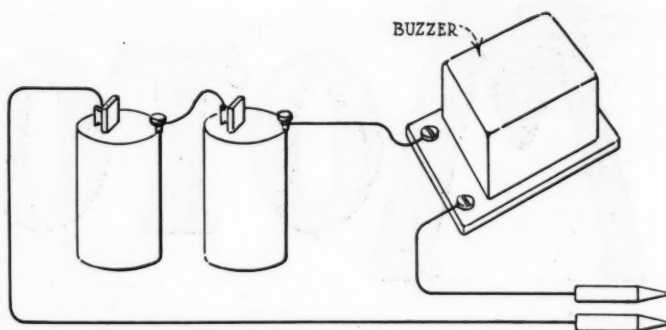


Fig. 4—Buzzer test set

circuit is at the terminals of the current source, such as the battery. Therefore, to measure the voltage of the battery, the two binding posts of the voltmeter are connected to the two terminals of the battery respectively. Some voltmeters and ammeters are polarized, that is, they have their binding posts marked plus and minus respectively, and these binding posts must be connected to the corresponding sides of the circuit. With other types of instruments, it does not matter which way they are connected in circuit.

For determining and locating troubles in the wiring and parts of electric systems, use is made of one or the other of a variety of devices giving either a visible or an audible signal when a current flows through them. These include incandescent lamp bulbs, bells, buzzers and telephone receivers. The bulbs may be of the regular house lighting variety, 110-volts, and current from the service mains may be used. In that case it is preferable to use carbon filament bulbs, as these will withstand more vibration than tungsten filament bulbs, and though they take more current, this is of no consequence because the current used for testing is insignificant in any case.

Using a Test Lamp

The testing lamp is arranged as illustrated in Fig. 2. One of the two strands of the cord leading to the lamp is cut, usually close to the lamp, and to each end thus obtained is soldered a length of lamp cord 4 to 6 ft. long, the soldered joints being carefully taped with adhesive tape as used by electricians, to prevent them from coming in metallic contact. The other ends of these two wires are wrapped around and soldered to steel rods or spikes about 6 in. long, whose free ends are ground to a sharp point. The parts near the joint of the wire to the rod is heavily taped, partly to form an insulating handle for the operator and partly to prevent localization of bending at the junction, which would result in an early break. The object in providing the rods with sharp points is to permit an exceedingly high pressure in proportion to the area of contact being obtained, which will insure metallic contact in spite of any film of oxide or dirt with which the metal surfaces may be covered.

Instead of using current from service mains and 110-volt bulbs, current from a low-voltage battery, such as an ignition or car lighting storage battery, or a dry cell battery, may be used, together with a low-voltage lamp and bulb. The arrangement is substantially the same as in the previous case, the outfit including the battery, the lamp and a pair of contact pins, besides the necessary wiring, as shown in Fig. 3.

A dry cell battery of five cells is somewhat more convenient for this work than a storage battery, mainly on account of its lower weight but also on account of its greater cleanliness. Though modern storage batteries are practically non-stopping, the dry-cell battery has absolutely no free electrolyte, which is better. A dry-cell battery also is better adapted than a storage battery to the service of furnishing momentary currents at more or less extended intervals, because it deteriorates less rapidly during periods of non-use. Of course, where current is required more or less continuously and in considerable quantity, the storage battery has the advantage.

Some testers prefer devices that give an audible indication,

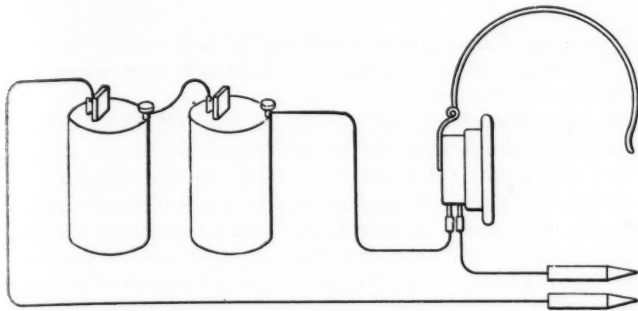


Fig. 5—Telephone test set

and in this class belong the bell and buzzer, Fig. 4, on the one hand, and the telephone receiver on the other, Fig. 5. The handiest form of the latter type of instrument is the head receiver as used by telephone operators at telephone switchboards. It has the advantage that it does not have to be held in the hand and leaves both hands free for manipulating the test points and making and undoing connections. Whether a bell, buzzer or telephone receiver is used to indicate current flow, a battery must be provided to furnish the operating current. A couple of dry cells will give a clearly audible signal with any of these devices.

Current indicators giving an audible indication are preferable to lamps, especially where continuous tests have to be made, as in testing out the different sections or coils of an armature. In bright daylight an incandescent lamp lighting up does not strongly impress the eye, and if the testing points are moved quickly from one section to another, the observer is apt to fail to notice the light signal. Another consideration is that the operator has to have his eyes on the points when establishing contact and then must look at the bulb to see whether it is lighted up, whereas with an audible signaling device he need not remove his eyes from the contact points.

Classification of Troubles—Simple Tests

Because of the low voltage of the batteries, the testing devices described are not well suited in case a fairly high degree of insulation is required. It is then better to use a testing magneto. This is nothing more or less than a telephone magneto with a bell and with two lengths of cords with test pins attached, Fig. 6. The magneto is cranked by hand and gives a very high voltage which will force a current through poor connections or leakage paths. Such a testing magneto, if much testing has to be done, should be operated by two persons, a boy turning the crank while the tester manipulates the test points.

Electrical troubles may be either in the major parts of the electrical equipment or they may be in the wiring connecting these parts. There are essentially four classes of general electrical troubles, namely, an open circuit, a short-circuit, a ground and a poor connection, which latter is an incipient form of open circuit. An open circuit is a circuit with a break or interruption in it at any point. Voltages of the order used for lighting and starting will force a current only through a continuous or unbroken circuit of conducting material. If the circuit is open, no current can flow. The most familiar forms of an open circuit are a broken lamp filament and a burned-out fuse. Of course, the term "broken circuit" usually is applied only if there is a break in the wiring outside the main parts of the system or at the connections. If there are any poor connections in the circuit, the result is that the resistance in circuit is greater than it should be and the current flow will be reduced.

A short-circuit is a derangement of the wiring or other parts of the circuit which allows current from the source, that is to say, from the battery or generator to return to it without flowing through the connecting devices such as the lamps. A complete short-circuit prevents current from flowing through the consuming device. For instance, if the two wires connecting to an incandescent lamp are bared of insulation and twisted together where they enter the lamp socket, no current can flow through

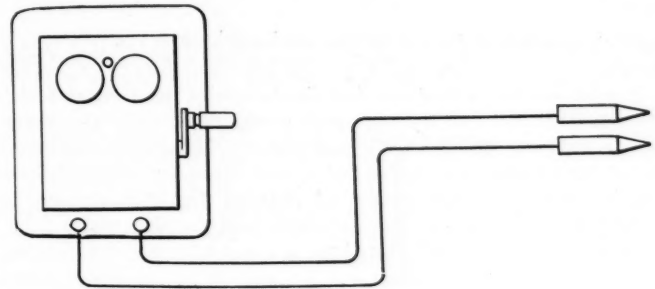


Fig. 6—Testing magneto

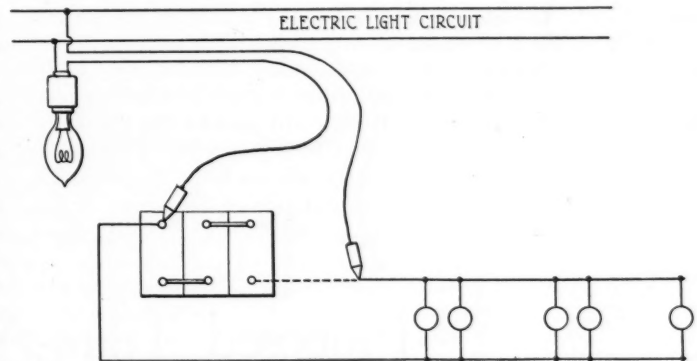


Fig. 7—Method of testing for a short in a lamp circuit by a testing lamp

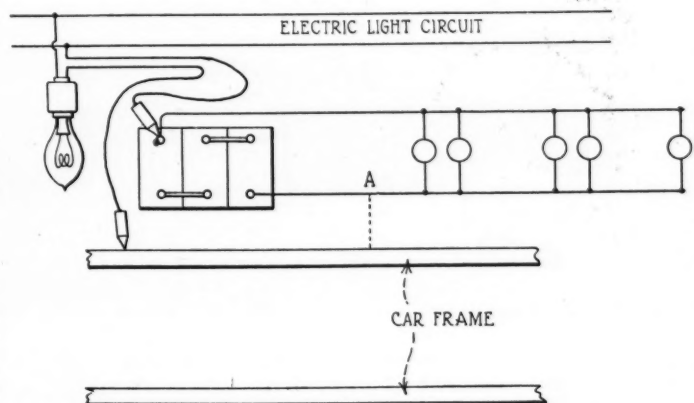


Fig. 8—Method of testing for a ground in a lamp circuit by a testing lamp

the bulb. A complete short-circuit results in an excessive current flow and a rapid drain of the battery, if not the fusing of the wires. A partial short-circuit, often referred to as a leak, may not greatly interfere with the operation of the consuming devices but will result in the waste or loss of energy, and as such is objectionable.

A ground is a metallic connection between the insulated wiring of the circuit and the metallic mass of the chassis or engine. A distinction must here be made between the two wiring systems used in connection with electrical equipment, the insulated return system and the ground return system. With an insulated return or two-wire system a ground on one side of the line is not immediately harmful, as it does not interfere with the operation of the system. No battery current can flow into the frame of the car or engine, because there is no return path. However, if another ground should develop on the other side of the line, the two grounds together would form a short circuit which would drain the battery and deprive the part to which the grounded wires are connected of current. For this reason it is always desirable to keep an insulated return wiring system entirely free of grounds, which are really incipient troubles. In the case of ground return wiring, as now used with the great majority of

lighting systems, a ground on the insulated line is really a short-circuit.

It must not be understood that short-circuits, open circuits and grounds occur only in the wiring of a car. They may also occur in the different parts of the equipment. It already has been stated that burned-out bulbs and blown fuses are cases of open circuits, and there are plenty of chances for short-circuits to develop in such parts as the generator and starting motor.

Suppose it is suspected that there is a short in, say, the lighting circuit. This can be tested out by any of the testing outfits already described. When all the bulbs are unscrewed from their sockets no current should flow through the wires connecting to the lamps, and if a current does flow, it proves that there is a short-circuit. Therefore, remove all of the bulbs from their sockets, close all lamp switches, open the circuit at the battery by removing one connector from the battery terminal and touch the test points to the connector removed and the other battery terminal as indicated in Fig. 7. We will assume the lights are wired on the insulated return principle, or two-wire. Then if the test lamp lights up when contacts are made as described, it proves that current can flow from one side of the circuit to the other though all of the bulbs are removed; consequently, there

must be a short-circuit somewhere on the line. To locate the exact position of the trouble requires additional tests which will be described further on.

To determine whether there is a ground on the circuit, all the bulbs should be left in place, the lamp switches turned on and the two test points connected respectively to any bare part of the circuit and a part of the frame. The connections are shown in Fig. 8. If there is no ground, no current can flow through the lamps, and it will not light. Now suppose there is a ground at A. Then the test lamp will light up and the path of the test current easily can be traced. It does not matter whether or not the ground is on that side of the lighting circuit to which the test point is touched, the test lamp will light up in either case. The location of the ground also calls for either a careful inspection of the whole line or for further tests.

Open circuits always manifest themselves in an unmistakable manner. For instance, if there is a break in a lamp circuit, the lamp cannot burn. If the break is in one of the main wires, of course all the lamps will go out, whereas if the break is in one of the branch circuits, only the lamp or lamps on that particular branch will become extinguished. Thus some indication as to the location of the trouble is furnished by its effects.

Proposed Trans-Atlantic Air-Liner

Many Plans Under Way to Make Celestial Traveling an Actuality



HERE is the ocean liner of the future. At a recent exhibition of airships at Prince's gallery, London, the above model was a center of interest. It is a model of a proposed liner capable of carrying 600 persons or 75 tons of mail and will travel over Trans-Atlantic and Oriental routes.

It is expected the ship will be able to make the journey between New York and London in 48 hours.

See Flights in Near Future

Recent news reports from England indicate that Trans-Atlantic air traveling is not so remote a possibility as most persons believe. Each week sees the established Paris-London air service more fully recognized as a commercial possibility and from that to a London-New York service seems a minor jump in these days of rapid development of the aircraft.

Where the London-Paris air line was first a "stunt" enterprise and only in war was really valuable as a means of transporting passengers, at present it is becoming a big commercial asset.

This information shows that the machines making the flight have flown

more than 10,000 mi. and that, out of 42 scheduled flights, only one was not completed. This record has been made despite hampering weather conditions at the start.

The average time of flight has been 2 hr. 15 min., the longest trip having consumed about 3 hr. Passenger bookings have been satisfactory, it was said, and a large amount of express is being carried. Banks have begun to use the line for the transfer of money and papers, and one London newspaper has made arrangements to have French advertisers use the service. The advertising copy may be turned into the branch at Paris up to 9:30 a. m. for appearance in the London papers of the following morning.

Plan London-New York Line

A news report this week chronicles the formation of a company which proposes to establish a regular air service between New York and London. In addition, this company contemplates a service to Australia and other British colonies.

This company, known as the Northern

Aerial Syndicate of Great Britain, is arranging a passenger airship service to this country, according to reports from Trade Commissioner Henry F. Grady. The plans are for airships carrying 150 passengers in addition to crews, to serve the westward and eastward passages between England and New York. Plans are also arranged for service to Perth, Australia, this journey to be made in seven days. Passengers from America will be deposited at Liverpool, transferred to smaller craft and taken to their destinations.

Limit Civilian Flyers

Meanwhile, the United States has begun to take a real interest in aeronautics as is evidenced by the increasing demands in Congress for the formation of a separate department to have charge of this branch of the national defense. The war-time flavor is kept by the first order of the War Department which was promulgated last week prohibiting civilian flyers from operating aircraft over "the vicinity of fortified areas within the boundaries of the United States including the Panama Canal Zone."

120 Motor Cars Exhibited at Paris Show

Designs Show Influence of War and After-War Conditions

PARIS, Oct. 9 (Special Cable)—The result of six years' war experience is embodied in the exhibit of 120 motor car manufacturers who are showing in the Paris Automobile Show which opened here today. So important does France consider the automotive industry that President Poincaré, attended by leading members of the government, officially opened the show in the Grand Palais, France's \$5,000,000 show house. This being the first motor show in Europe since 1913, interest is unbounded and the total of 800 exhibitors indicates the magnitude of the show and the interest of the people. The value of the exhibits at the show is estimated at \$3,000,000. All the French and Italian manufacturers are on hand. One-half of the Belgium manufacturers are represented. England has eight of her manufacturers here and the exhibit of American cars is greater than ever before.

The show is a general exhibit of Europe's post-war production and is the most interesting technical exhibition ever held in Europe. It has been difficult for most of the manufacturers to have their chassis completed in time and it is certain the manufacturers are not ready to go into immediate production on the new models.

Prices Are Not Settled

Prices are not definitely settled by several of the manufacturers. Renault, for example, has informed his agents that they are not to guarantee prices will remain unchanged until cars are delivered.

The exhibit gives the impression that European motor car manufacturers who have always aimed at high class work today appear anxious to show they are capable of producing the best cars in the world. Consequently, prices are high, and there are many beautiful chassis selling as high as \$5,000 francs. This would indicate that the high priced field is being given too much attention and that this market will soon be saturated due to the quantity production which is contemplated.

Light Cars in Two Classes

The European light car has not been neglected and while production has not gotten under way as was expected, extensive preparations are in progress. There are two distinct classes of European light cars.

Class 1—This has a small engine and has cramped accommodation for four passengers. Citroën is a leader in this class and his car is unchanged since first produced and exhibited at the Lyon Fair last March. At that time he hoped soon to attain a production of 100 per day but production is now only approximately forty a day. Peugeot is working

By W. F. Bradley.
(Special to Motor Age)

along similar lines for a light car. Renault has entered this field with a machine having a characteristic Renault engine and with a rear construction closely resembling Ford. This car has a two-speed gearbox mounted forward and carrying the front end of the torque tube. It was originally announced to sell at 8600 francs complete but the price has been increased to 12,000 francs.

Class 2—This is an American type car with a comparatively large engine, a three-speed gearbox which is generally a unit with the engine and accommodation for five passengers. Bellanger has brought out a cheap car in the design of which Benjamin Briscoe has co-operated. The job is entirely along American lines and is listed at 18,000 francs.

Cylinder Question Hits Europe

Lorraine-Dietrich has a medium priced car of simple design which it is believed will sell complete at less than 12,000 francs. This car has a six-cylinder valve-in-the-head engine and three-speed gearbox. It is the design of Engineer Barbarou, formerly engineer for the Delaunay Belleville.

Berliet is working on a car of American lines which was exhibited at the Lyon Fair last spring.

Suere is a new concern which has produced one of the smallest eight-cylinder engines in the world. The cylinders are 45 by 90 mm. or 1.7 by 3.5 in. bore and stroke. The chassis carries a two or three passenger body. It is a good production job, having the gearbox a unit with the engine.

The question of number of cylinders has struck Europe and fours, sixes, eights and twelves are all in the show. The number of four-cylinder types has increased.

Six-cylinder types are more prominent than ever before and some of those exhibited are Fiat, Delage, Lorraine-Dietrich, Brasier, Delahaye, Delaunay Belleville, Farman, Gnome, Hispano Suiza, Minerva, Peugeot, Renault, Rochet Schnider, Wolseley, Daimler and Sunbeam. The last three are British machines.

It was known last January that Darracq would bring an eight-cylinder car and that De Dion Bouton, the pioneer of eight-cylinder construction would also continue with eights. These are on exhibition. Other eight-cylinder types are Bellanger and the Suere with its miniature cylinders with 1.7 in. bore.

Lancia Is Only 12-Cylinder

The only twelve-cylinder car is the Lancia from Italy which is a remarkable job with an angle of 22 deg. be-

tween the two rows of cylinders. Each row of cylinders is a block casting of six. While this is the only twelve-cylinder at the show it is understood that Delaunay Belleville and the Lorraine Dietrich will build twelve-cylinder designs later in the year.

This show has a number of new concerns in the motor car business, firms which have come into existence during or since the war. Some of them were small organizations previous to the war but now these give promise of being factors in the industry. For example, Farman Bros. are building a high-class six-cylinder job. Formerly they have been in the aviation industry.

The Gnome and Rhone company, which was a pioneer in the development of rotary aircraft engines and one of the big producers of these during the war, has been developing a car for some time.

Bellanger is also marketing an eight-cylinder in addition to the cheap model on which Briscoe co-operated with them.

Following American Practice

An analysis of the chassis indicates that in many respects American practice is being followed. The spur to action in many cases has been reduced cost of production, in others it has been a turning to good practice.

The use of block engine castings is virtually unanimous, this applying not only to fours and sixes but to one of the twelves. The practice of detachable cylinder heads has been very extensively adopted, some firms using it being Fiat, Lancia, Lorraine-Dietrich, Peugeot, Delahaye, Clement Bayard, Suere, Bellanger and the British Austin.

Europe did not formerly take kindly to valve-in-the-head construction, due to the difficulty of silencing. Aviation practice has undoubtedly had something to do with picking up valve-in-the-head design which, while not used in the majority of cars, is coming to the front rapidly and will unquestionable be used largely next year.

With the exception of the cheap model of the Lorraine-Dietrich the valve-in-the-head engines are all expensive jobs, using overhead camshafts with the mechanism completely enclosed and every attention given to lubrication. This design applies to the new aviation type Hispano-Suiza engine and also to Lancia, Sazzaro, Spa, Farman, Gnome and Bellanger.

Little Progress in Aluminum Engine

Little progress or interest is shown in the all aluminum engine, the only example being the Hispano-Suiza built on aviation lines and using steel liners which are screwed into the aluminum casting.

The new Farman engine follows avia-

tion practice using steel cylinders with sheet steel waterjackets.

Less progress than expected has been made in unit castings of engine cylinders and crankcases, the cheap Renault being practically the only example of this design.

The Knight sleeve valve type of engine has stood still and the only European users are Panhard, Daimler and Voissin. Previous to the war several smaller firms were using it but they have dropped it. The poppet valve design is in the heavy majority.

Versatility in other valve designs is seen. Peugeot has a cuff valve type in a six-cylinder model. It is a short type of valve in the cylinder head. Piccard Pictet, the Swiss maker, continues its single sleeve valve engine. No other concerns are exhibiting poppet valve substitutes.

The war has given a great impetus to the use of aluminum pistons and about 45 per cent of the engines in the show have them. It is rather unusual that manufacturers are not making any publicity on this.

Electric Starters on Most Cars

The ignition field is giving indications of following American practice. Electric starters are on practically all models. The magneto has lost some ground because of the introduction of electric starting and lighting. Engineers, however, seem to be afraid of offending public taste by leaving out the magneto and in some cases have maintained it while having a sound ignition system in the generator. Hispano-Suiza has dropped the magneto on its high priced car. Darracq has dropped it on its eight-cylinder job. Lorraine-Dietrich has dropped the magneto on its patented system whereby the magneto and Delco generator are used with two sets of plugs and one distributor.

A vast majority of the car makers have adopted the unit construction engine gearbox with either three or four point suspension. This generally comprises the engine base chamber, which is in one, two or three castings, and clutch housing and gearbox. Among the cars adopting this practice is the Farman.

The prevalence of bad roads, owing to war conditions, caused a large amount of attention to be given to chassis solidity, steering gear and more particularly to springs and brakes. Generally speaking, the frames are much deeper, in several cases running to a depth of 7 in.

An important increase is noted in the number of screw and nut steering gears. Also there is a tendency to mount steering gear boxes on the engine hangers instead of on the frame hangers, as has been the European custom.

Cantilever Springs Prominent

Cantilever springs are prominent on all classes of cars. Because of the complaint that this type of suspension causes a car to roll when high speed is attained, the Lancia has produced a combination cantilever and semi-elliptic suspension. The rear end of the cantilever spring is attached to the axle by a short, heavy steel cable with conical steel ends. The semi-elliptical spring is a broad single leaf. There are no spring eyes on this car, the ends of the springs being drilled and bolted to special shackles, which are readily changeable. Bellanger also has a system of spring attachment without spring eyes.

The cone clutch has lost much ground. Four speed gearboxes are still in the majority, although on several high class, high powered cars only three speeds are given. There is a strong tendency to-

wards the use of helical gear for constant mesh pinions and also in some cases for the second gear.

Hotchkiss Drive Loses Ground

The Hotchkiss drive has lost much ground. The Hispano Suiza, one of the most prominent supporters of this drive system in the cars now on exhibition is the central type, with enclosed propeller shaft housing which terminates in the sphere received in the corresponding female member, either on the rear gearbox or on central cross frame member. This system is adopted by Fiat, Lancia, Bellenger, Peugeot, Farman and others.

The worm drive is dead except in a few small cars which require a great gear reduction. It is not seen on any Continental cars. Gleason gears are used by nearly every maker and within a year may be expected to be found on a large per cent of Continental cars.

Front wheel brakes are a prominent feature.

There are fewer brakes on the transmission and more on the rear wheels. The drums have been increased noticeably in size and now go as high as 19 in. in diameter. The Hispano Suiza drums are made of cast aluminum with steel linings, but the majority of makers use steel drums. There is an extensive use of aluminum for brake shoes.

Few Wood Wheels Left

Wood wheels are in a very small minority. Metal wheels of varied types are used on 80 per cent of the cars. Wire wheels have not gained much ground and the steel spoke and steel disk wheels have about equal representation.

French manufacturers produced 50,000 cars in 1913, of which number 25,000 were exported. The production capacity of the factories in 1920 will be not less than 200,000 cars. This is a moderate estimate for Citroen, Renault and Berliet have a production capacity of 100 cars daily, or 35,000 cars a year, making a total of 70,000 for the group, and a combined total of 175,000 cars yearly. As there are about 100 automobile manufacturers in France this leaves only 25,000 cars to be produced by 87 manufacturers, or only 288 a year each.

THERE'S MONEY IN TRACTORS

If You Know How to Sell and Service Them

There are things you as a dealer must know—
There are things you as a dealer must do—

YOU MUST INVESTIGATE LOCAL CONDITIONS

Know the topography of your locality
Know what principal crops are grown
Know the financial standing of the farmers

YOU MUST SATISFY YOURSELF THAT

You are the man for the job
That you understand what you are doing
That you are willing to assume the responsibility and work

THEN GET TO WORK

You must be sure you have the right tractor
You must know about tractor equipment
You must know how to departmentize your business

Beginning next week, there will appear in Motor Age a series of tractor articles, which will tell the dealer how he can make money in the tractor business. These articles have been written by F. M. Loomis, Motor Age's tractor expert, for thirty-six years in the farm implement and tractor field as an implement dealer and writer on farm conditions.

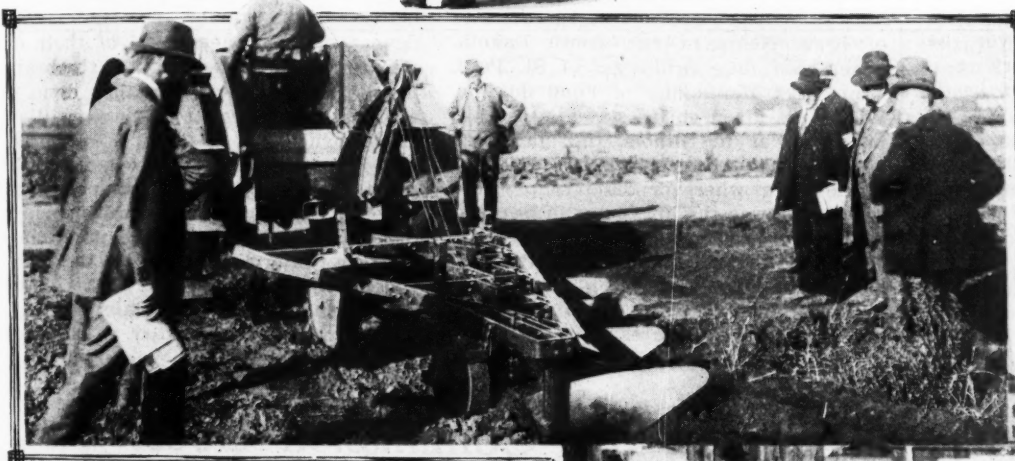
Loomis knows what he is talking about in these articles.

READ THEM

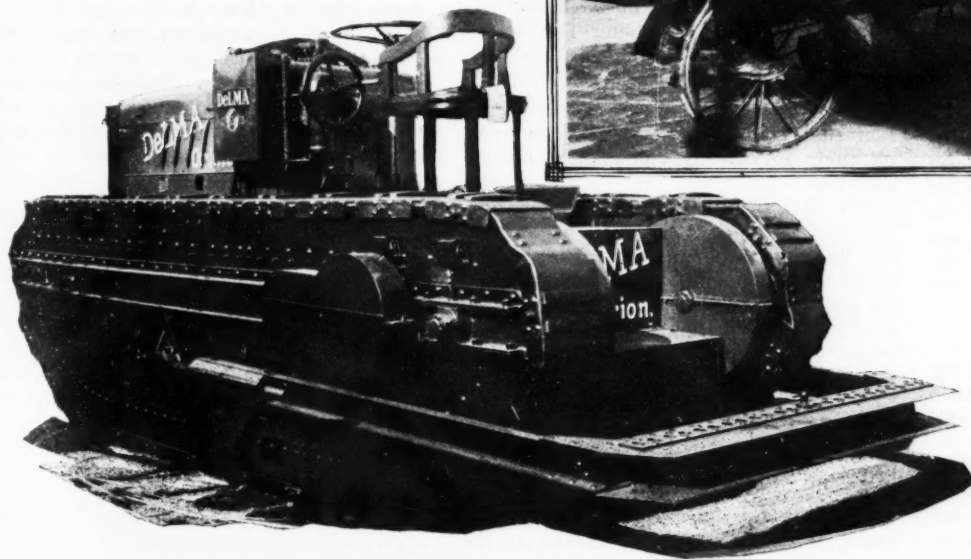
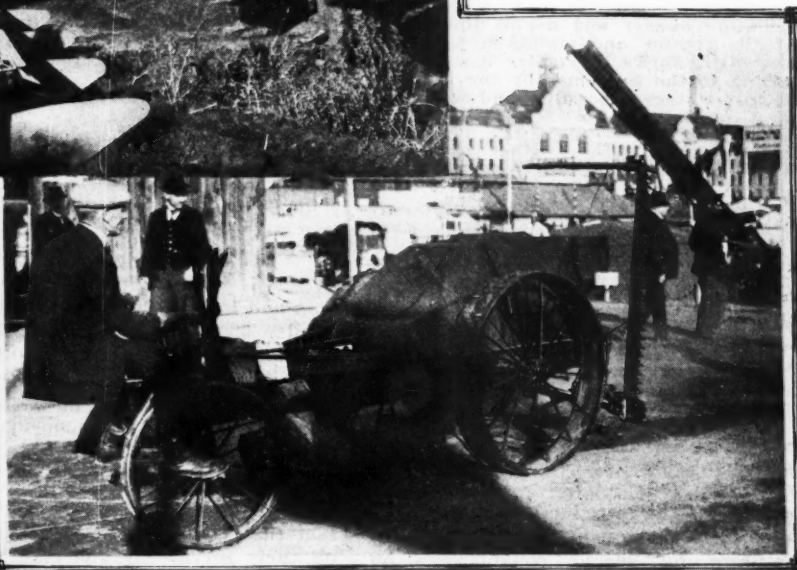
Beating Swords Into Plowshares



Germany is taking a more modern view of the situation, beating her tanks into tractors. The photographs are from the first tractor exhibition held in Germany in four years.



Perhaps hauling this plow will be a great deal more beneficial for Germany than the caterpillar's old duty—hauling big guns.



And at the left we have our old friend, a tank, cut down to fit agricultural necessities. Incidentally it might be said that Gen. Pershing did come of the cutting down about a year ago.

Fordson to Eliminate All Distributors

Ford Car and Tractor Sales to Be Combined Next August

CHICAGO, Oct. 10—Fordson tractor distributors are slated to go. The Fordson tractor and Ford motor car selling interests will be combined by Aug. 1, 1920.

This is the most radical change in selling policy any company in the tractor business ever has taken. It means the elimination of the men who are primarily responsible for putting the Fordson tractor on the map following its quantity production. In the last 18 months about 75,000 Fordson tractors have been put onto the farms by the distributors and by the time their organization relinquishes control 10 months hence, this number probably will be about doubled.

No Reason for Change Is Given

In making announcement of the change in selling policy the company makes public no reasons. It asserts, however, that all of its distributors are working in harmony with the company to make the change effective.

That the distributors are acquiescing gracefully at least is indicated by a letter, which was sent to all of his dealers by one of the leading state distributors. The letter says, in part:

"The owners of this business are evidently of the mind to make a single distributing agency and handle the product of the tractor and motor car. You all know Mr. Ford's life policy has been the saving to the consumer by the reduction of cost wherever possible, and we believe

the merging of the tractor and the Ford car will work to this end and create quite a saving in distribution. Consequently, in pursuance of this policy, the distributors are being given notice many months in advance of the expiration of their contracts."

Abandon Distributer Plan

When Henry Ford & Son began the distribution of the Fordson tractor by states in March, 1918, the United States was covered by distributors within a comparatively short time. For the most part the men who secured these coveted positions were prominent Ford car dealers in their respective cities, although there were two or three instances of men from other organizations being given a chance. One of these exceptions was Watson of Wichita, Kan. Herring, of Des Moines, Ia., was perhaps the most favored of all, since he was given control of the three states of Iowa, Nebraska and South Dakota. Other men, like Schmetzel of St. Paul, Minn., and Meiklejohn of Fond du Lac, Wis., were given entire states. In other instances, as in Illinois, the state was divided between several distributors. But whatever or wherever the territory, the distributor was the big factor in Fordson distribution and to all appearances the organization was committed to the distributor plan.

The new policy eliminates the distributor entirely and will result in the Fordson being sold direct to the dealer. The

combination of the Fordson and Ford car selling interests indicates an intention to utilize the numerous Ford plants throughout the country as distributing places for the tractor. Whether there will be concentrated at these points also the line of tractor implements sold with the tractor is unknown at present.

Many Firms in Same Policy

Whether the company has special reasons for making this change or whether it is part of the tendency apparent in the tractor business toward the elimination of the distributor, no one seems willing to say at this time. It has been well known for some time that the tractor distributor, as a general proposition, was slipping in favor of the branch-house plan of organization. A number of the better-known tractor companies have done away with nearly all of their distributors and have substituted the branch house and now that Ford has done the same thing, the tendency will be strengthened.

It is interesting to speculate on what effect this change in selling policy will have on the price of the Fordson. From the letter quoted above one might infer that the dealer is to share in the saving effected by the cutting out of the distributor's commission, or again, that the farmer may be permitted to share in the saving by reduced prices.

"Free Service" Argument for Commission Boost

By F. M. Loomis

(Motor Age Editorial Staff)

CHICAGO, Oct. 11—Repair business is the corner stone of service, and service is the foundation of successful business, declared one of the speakers representing the National Federation of Retail Implement Dealers' Associations at its annual conference with the Sales Managers' Department of the National Implement and Vehicle Association, this week.

This was the introduction to a demand made by dealers upon the tractor manufacturers for larger commissions on tractors in order to cover the cost of service a dealer must render. In all probability the dealers are correct in their contention that larger discounts are needed in order to make the business profitable to them.

Confronted With "Free Service"

The retail implement dealer cannot see anything but free service. It has been custom of implement trade through all the years to give farmers all the service the latter demanded without charges. The dealers assert that their hold upon the farmer is based upon this fact and that to change from this traditional cus-

tom and begin to charge for service they render on tractors will lose them their hold on the farmer. Contending that it is necessary for them to give this service they insist that the manufacturer shall pay for it by giving larger discounts.

The weakness of the position taken by the dealers is in their overlooking the fact that it is possible to make a profit on their service by charging a reasonable price for it and making the service worth the price. It has been the experience of tractor dealers who are doing business according to modern business methods that the farmer makes no objection to paying for the kind of service which is rendered promptly and which keeps his tractor in condition to work.

Makers Have No Reply

There can be no doubt that the tractor manufacturers, through their representatives at the conference, took this view of matter, because they made no effort to answer the arguments of the

dealers nor did they in any way admit the justice of the dealers' claims.

It is probably true that tractor discounts as a rule are too low and should be larger in order that the dealer can make a reasonable profit on his tractor trade. But it surely is true that neither retail implement dealers, nor dealers of any other kind, ever will be able to convince manufacturers that commissions should be increased unless they prefer their request on some other basis than that service on tractors should be free and that manufacturer should stand the burden.

FORDSON MEN IN CONFERENCES

Bloomington, Ill., Oct. 15—The Dayton Keith Co., distributor of Fordson tractors in thirty-five counties of Illinois, is holding a series of meetings by counties of sub-dealers in order to stimulate the sale of tractors in the fall and winter months and thus to relieve the demand during the summer months. It is regarded as important to divide the business more evenly throughout the year rather than to crowd so much into the spring and summer months.

Implement Men Want Sole Sale of Tractor Tools

CHICAGO, Oct. 12—Resolutions protesting the sale of specially built power farm equipment to tractor dealers who are outside the ranks of the regular retail implement trade, were passed by the National Federation of Retail Implement and Vehicle Dealers' associations, which closed its annual convention here today.

The resolutions set forth:

First: That the business of the retail implement dealer will fail unless he follows the example of the more progressive dealers and takes on the tractor, the motor truck and the motor car.

Second: Warning tractor manufacturers against placing tractor agents too close together.

Third: Condemning the sale of specially built tractor implements to dealers other than regular retail implement dealers.

The action of the resolutions committee was instigated by a formal protest introduced by J. F. Follmer, Vicksburg, Mich. and L. Wolf, Mt. Clemens, Mich., representing the Michigan association of retail implement dealers.

This protest set forth the allegation that certain implement manufacturers, while making a line of horse-drawn machinery which they expected the regular retail dealer to market, made also a line of tractor drawn implements, in the marketing of which the implement dealer is ignored and the line sold extensively to motor car dealers who thus are put

Implement Dealers Resolve That—

The tractor, the motor truck and the motor car are revolutionizing the implement trade. We urge our membership to take advantage of the experience of these of our number who have thoroughly tried them out and who are enthusiastic in their praise of this department of their business and who see vast possibilities in the future of power farming equipment. It is an established fact and must be so recognized by the implement dealer or his business will certainly fall away from him.

TRACTOR DISTRIBUTION

The federation will bring to the attention of tractor manufacturers the danger of crowding tractor agencies in too closely. We believe such action will finally result to the disadvantage of both buyer and seller and we would offer the suggestion that a careful survey of the field be made before definitely drawing territorial lines, bearing in mind the stocks of repairs necessary to successful tractor service and the inadvisability of such stocks where the territory is too proscribed.

QUESTIONABLE SELLING

We regret that some prominent plow manufacturers are permitting their product to be marketed through tractor agencies to parties who are not implement dealers in any sense—to the direct injury of the legitimate dealer—in many instances, who carries the agency for the same line of goods.

into direct competition with the implement man, much to the detriment of the latter.

The Michigan delegates insisted upon the Federation taking cognizance of this situation and demanded that resolutions condemning the practice be adopted. The

resolutions passed by the Federation were the result and may be accepted as the majority opinion of the delegates present.

Motor Dealers Getting Stronger

The discussion on the motion referring the question to the resolutions committee brought out statements from individual dealers which indicated how seriously alarmed the implement fraternity is over the inroads the motor car industry has made into the tractor and power farm equipment trade. It is a realization of danger of loss of trade which at last has aroused the implement dealers.

As long as there was nothing involved but the control of the tractor business, the implement men, relying upon the belief that the tractor is an implement and therefore belongs by right to the implement dealer, did not appear to regard motor car dealers as a dangerous competitor. But with the appearance of the specially built lines of tractor implements, the implement trade began to wake up to the fact that something must be done.

The thing which primarily has alarmed the implement trade and which has aroused the greatest amount of indignation is the entrance into the implement trade of hundreds of motor car dealers by way of the Fordson tractor and the equipment which has been built to sell with that tractor.

Want U. S. to Act on Brake Tests

CHICAGO, Oct. 10—Tractor manufacturers have put official drawbar and brake tests of tractors up to the United States Department of Agriculture. A resolution embodying this request is one of the results of the Farm Power Conference held here this week at the call of Secretary Houston.

The conference was called for the "confidential information" of the department and virtually nothing has been made public regarding the two days' sessions. A set of resolutions recommending certain lines of investigation to be undertaken by the department was adopted and this has gone to Secretary Houston for his consideration. Among the resolutions was one calling on the department to undertake tractor tests and to authorize official ratings which should be recognized as such throughout the country.

Manufacturers Want Tests

The request to the department was preferred by the tractor manufacturers attending the conference as a measure to forestall threatened legislation by a number of states similar to the tractor test law which was passed last spring in Nebraska.

The Nebraska law provides that no tractor shall be sold in the state until a sample machine has been tested by three competent engineers of the state university at Lincoln who shall report to the state railway commission. The commission will compare this report with the specifications and claims of the manufacturer or agent as set forth in advertisements or sales arguments and shall deny permit for sale if these specifications or claims shall be found to be false in any way.

Federal Tests Save Expenses

About \$30,000 has already been expended by the university in preparation for the tests which will begin within the next 60 days. In the meantime, temporary permits have been issued the tractor companies under which they now are selling, provided they conform to the second section of the law which demands that an adequate stock of repairs and parts be carried by the company at some point in the state.

Tractor manufacturers fear similar legislation in many states and in order to escape the heavy expense that would be involved and to avoid the possibility of numerous state official ratings, which

necessarily would conflict because no two of them would be made under the same conditions, they are anxious to have the government establish an official testing station and establish official ratings which will be recognized everywhere.

Wish Congress to Act

It is understood the department would have to be authorized to undertake this work by special act of Congress and a special appropriation also would have to be obtained to cover the expense. The resolution suggests that proper representations be made to Congress to bring this about.

The conference was attended by representatives of the Department of Agriculture, including officials from the offices of Animal Husbandry, Rural Engineering, Good Roads Bureau and others; tractor manufacturers; agricultural college professors; agricultural and agricultural research engineers; representatives of national associations such as the Saddle, Hay and Feed Dealers, Horse Breeding Associations and plain farmers.

The avowed object of the conference was to consider ways and means.



EDITORIAL



The Distributer Passes

APPARENTLY the distributor is disappearing from the tractor trade. On a news page of this issue is the story of how a new sales policy eliminates him from the Fordson tractor organization. This particular organization was based more completely upon the distributor plan than was any other in the business. It was through large distributors, many having a whole state, that the tractors were marketed in record quantities. Therefore, the change is the more important.

OTHER tractor companies have been doing away with their distributors, substituting for them regular branch houses. They have not been so precipitate as Ford & Son, but the movement has been no less sure. Is the distributor to be eliminated entirely? It begins to appear so, and thus leads to the query as to what useful purpose the distributor serves in the automotive trades and what a distributor or dealer contract is worth.

The Truck and the Farmer

PRIMARILY we are an agricultural nation. Our farms are a great potential truck market. Only three per cent of farmers own trucks today because their advantages have not been brought home to them with sufficient force. A 3000-mile truck tour through the great Northwest has awakened us to the sales opportunity in his field. It is a most important lesson to the manufacturer and dealer. The door has been thrown wide open. The farmer's business is the most desirable business in the field today because it can be operated on a cash basis. The farmer has what the city buyer lacks, bank support.

for 15 cents a ton-mile. It does not eat 5 acres of farm products a year when not working.

Of the 328,000 trucks estimated for production in 1919 considerable less than half of these are suited for farm work. Trucks for farm work must have a combination rack and side-board body, a wide range of gear ratios for varying terrain conditions and a wheelbase adapted for this work. Long wheelbase trucks cannot be used in present grain elevators. Manufacturers must revise their distribution schedules and send more trucks to farm areas. They must impress upon their dealers that the demand is there. Crop production can be accelerated by these time-saving machines, and thus can the cost of living be reduced.

The rural field deserves investigation.

THE pneumatic-tired truck is a time and energy saver for the farmer. It costs him 33 cents per ton-mile to haul with horse power, whereas the truck can do the same work

Accessories Reduce Overhead

TOO great an overhead expense has been the cause of failure of many a business. Sales and service businesses in the automotive field have not been exempt from this difficulty. A top-heavy overhead often has been the cause of the downfall of many otherwise successful establishments. Many dealers have found that the most logical and effective means by which his overhead can be materially reduced is through the sale of accessories. This of course, includes the additional equipment which the owners need. Sometimes they do not know that they need the equipment and can be brought to realize its value by a little sales effort in that direction.

INCIDENTALLY, there is opportunity for a double profit on certain types of equipment which requires labor for its installation. With this equipment the dealer or service station can sell not only the equipment, but can also make a profit on its installation. Usually, the show case and stock room for accessories utilizes space that otherwise would not be valuable and it takes but little time to sell a new owner several accessories after he has given his order for a car. We know of one dealer who never lets a buyer get away with a new car without selling him some of the extras that should go with it—and repeats when he comes back for service.

WINTER SERVICE NUMBER

How to keep business going in an otherwise slack season—How to build a reputation for a good shop that will be a car sales asset when there are cars to sell—How to keep the men busy at a profit and avoid breaking in new men in the Spring.

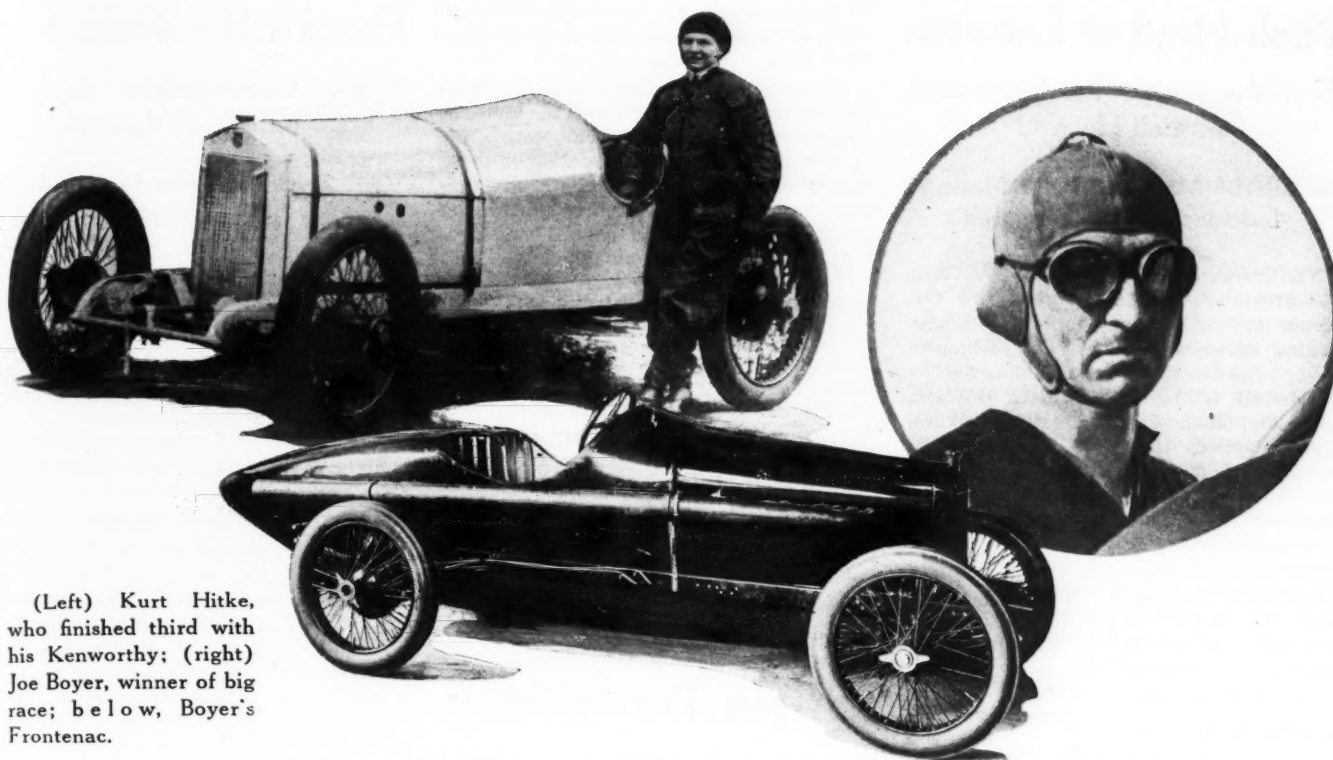
How to make two profits from accessory sales—through selling and installing equipment for Winter—How others have done it—successful methods of other dealers, garages and repairmen.

How to select the profitable lines—with descriptions and prices, illustrations and methods, tools and time required to install winter accessories—How to prepare your service shop for winter service.

Better methods showing how to rebuild used cars during slack periods.

What work should be done on passenger cars at this time—illustrating step by step methods.

There is money in tractor service in winter. How to get that business and handle it at a profit will form a part of the



(Left) Kurt Hitke, who finished third with his Kenworthy; (right) Joe Boyer, winner of big race; below, Boyer's Frontenac.

Joe Boyer Winner at Cincinnati

CINCINNATI, OHIO, Oct. 12—After numerous discouragements and postponements, the world series sweepstakes was run this afternoon at the Cincinnati Speedway in celebration of the winning of the National League pennant and of the world championship by the Cincinnati baseball club. The winner turned up in the person of Joe Boyer, who, driving a Frontenac, made the creditable time of 101.69 m.p.h. Art Klein, driving a Peugeot, finished second and Kurt Hitke, in a Kenworthy, third. It is understood this is the rebuilt Roamer driven in previous races by Hitke and entered by C. Y. Kenworthy, Chicago Roamer dealer.

The winner owed his victory to steady driving and rare good fortune.

Makes Only One Stop

He made only one stop during the entire race of 250 mi., this being when a tire picked up a splinter when making a turn. Not until the first 100 mi. had been covered did he appear among the leaders. After occupying second place at the end of the fifty-fifth lap, he dropped back for a time, only to come back later and take the lead after the 100 mi. mark had been passed. From that time he was never distanced except for an instant at the 120th lap, when Art. Klein's Peugeot passed him for a few moments. Klein, however, was compelled to drop back, and was prevented by tire trouble from resuming the chase, but held on for second money.

Ill luck befell both the early pace-makers, Gaston and Arthur Chevrolet, the latter driving in place of Louis Chevrolet, who was severely burned Sep-

The order of finish:

Car	Driver	Time	M.P.H.
Frontenac	Joe Boyer	2:27:19.29	101.69
Peugeot	Art Klein	2:30:20.32	99.08
Kenworthy	Kurt Hitke	2:34:31.65	97.00
Meteor	Dave Lewis	2:37:39.61	95.25
Stickel	D. Hickey	2:39:24.10	94.25
Bender	Tom Alley	2:40:21.24	93.55
Oldfield	Waldo Stein	2:41:52.75	92.75
Toft	Omar Toft	2:46:35.72	90.2
Peugeot	Paul Harvey	Flagged.	

tember 20 at Sheepshead Bay. Gaston stole a march on the rest of the field in the second lap, but was overhauled

by his brother, to whom he surrendered the lead, then dropped many laps behind when engine and tire trouble developed. Arthur then showed a tremendous burst of speed, but on his fifty-fourth lap his machine broke through a board on the flooring of the track, a piece of the wood piercing his radiator. He was forced to retire.

Ralph De Palma tried to get rid of his jinx by letting James Murphy drive his Duesenberg for him, but to no avail, for his car was the first to retire. Aside from several stretch duels, the race was almost entirely devoid of features.

Attendance Is Small

Threatening weather kept the attendance down, as not until noon did the clouds clear away and the sun come out to dry the track, sodden from the rains which caused postponement from the previous days.

Singular misfortune has attended the efforts of the Cincinnati speedway management to stage its first post-war race. Postponement first was caused by the opening of the world series for the baseball championship in October, then by rain on the following Sunday, and again by rain yesterday. Speedway officials however, announced their determination not to yield to discouragement, as they believe they have an unusually fine track and plant and are making plans for next year accordingly.

Fifteen drivers started in today's race, of whom nine finished. Those who retired were Joe Thomas in a Mercer, Eddie O'Donnall in a Duesenberg, Toland Nicholson in a Hudson, G. Chevrolet, A. Chevrolet and Murphy.



Art Klein, winner of second place at Cincinnati

Nash Head of Lafayette

Kenosha Maker President with
McCall-Howard

Details of Machine to Be Made at
Indianapolis Not Disclosed

CHICAGO, Oct. 11—Charles W. Nash, president of the Nash Motors Co., Kenosha, Wis., is one of the big figures behind the new "mystery car" which is to be manufactured in Indianapolis by D. McCall White and Earle C. Howard. Lee, Higginson & Co., Boston brokers, divulged today that the McCall-Howard car is to be manufactured by the Lafayette Motors Co. in Indianapolis and that Nash has been named as president of the new corporation.

The complete list of officers of the new corporation is, Charles W. Nash, president; D. McCall White, and Earle C. Howard, vice presidents, and James J. Storrow of Boston chairman of the board of directors.

Surprise in Announcement

Nash's association with the White-Howard company was a big surprise in motor circles and his name had not previously been associated with the new concern. He is heavily interested in the concern financially and while he will not be in active management of the company, will devote considerable of his time to it in an advisory capacity. He will continue his present affiliations with the Nash Motors Co.

Articles of incorporation have been filed for the new company naming the capitalization as \$6,000,000 of non-voting, cumulative preferred stock with a par value of \$100 and 40,000 shares of common stock of no par value. The present issue of preferred stock is \$4,000,000. With the 40,000 shares of preferred stock will be issued 10,000 of the common. Apart from the shares thus secured by the purchasers of preferred stock, the common stock will be held by Charles W. Nash, D. McCall White, Earle C. Howard and Lee, Higginson & Co.

Mr. White is perhaps best known for his successes as designer of the English Daimler and Napier engines, and the Cadillac eight in this country.

NEW ROLLS-ROYCE IS HERE

New York, Oct. 13—The first Rolls-Royce cars to reach America since the armistice have arrived at the showrooms of Robert W. Schuette, Fifth avenue. A self-cranking apparatus is the feature among several additional appliances.

MERCER CO. TO REORGANIZE

Chicago, Oct. 13—The Mercer Automobile Co., Trenton, N. J., is to be re-organized as the Mercer Motors Co., which is to acquire all the properties, business and assets of the former concern, or substantially the entire capital stock, and is

to be provided with \$1,000,000 additional cash, according to advices received from New York interests.

Emlen S. Hare, formerly vice-president of the Packard Motor Car Co., is to be president of the new Mercer Motors Co. It is understood that production is to be increased to 250 cars per month by January, 1921, through the expenditure of about \$650,000 of the cash being provided by the present finances.

ISSUE RULES ON EXPRESS PACKING

New York, Oct. 5—Paper wrappings will not be permitted on express packages weighing more than twenty-five pounds after Dec. 9. The new rules are being put into effect by the American Railway Express Co. to induce shippers to turn their business over to the carrier so that it can be handled properly.

When packages are over the weight limit wooden containers or fibreboard, pulpboard or corrugated strawboard containers of specified test strengths are required.

To Show Tractor-Trailer

Exposition Is Carded for New
York This Week

Motor Vehicles Are Expected to
Predominate

NEW YORK, Oct. 10—Among the important automotive industries represented in the International Exposition of Industries, at the Grand Central Palace, will be the Tractor Trailer and Farm Implement Exchange, week of Oct. 15.

This exhibit will contain a large variety of farm tractors, power farm implements, harvesting machinery, silos, farm water plants, automotive equipment and hundreds of small and large agricultural implements to be used in connection with automotive farming machinery.

The exhibit is particularly timely since the shortage of farm labor and its extraordinary cost have placed a burden on the farmer that only can be relieved by turning to mechanically propelled implements.

NEW CAR FIRM ON COAST

Detroit, Oct. 12—M. A. Leach, formerly of Detroit, has organized the Leach-Biltwell Motor Co., at Los Angeles, Cal. A \$1,000,000 plant is now in course of construction and a six-cylinder car to be known as the Leach Power Plus Six will be produced. The new company has taken over the Leach-Biltwell Co., the organization which Mr. Leach is operating for the manufacture of custom-made cars. A production schedule of 900 cars is planned for 1920.

The officers of the company are: President, M. A. Leach; vice-president, L. G. Martin; secretary and treasurer, E. P. Hughes; production manager, R. A. Wilson; director of purchases.

Farms a Big Truck Field

Rural Communities Learning
Value of Vehicle

Only 3 Per Cent of Husbandmen
Now Supplied

CHICAGO, Oct. 10—The agricultural districts of Illinois, Iowa, the Dakotas, Minnesota and Wisconsin are great truck distribution areas lying dormant. The farmer is thoroughly alive to what the pneumatic tired truck means to the modern farm. His financial condition enables him to do business on a cash basis. The banks are behind him strongly.

Makers Must Develop Market

Manufacturers and merchandisers must not neglect the farm market, for the truck is an important factor in increasing our food production while the number of people engaged in this industry is diminishing in proportion to the increase in population. This is the gist of a message brought by A. R. Kroh at the close of the 3000-mile National Motor Truck Development Tour staged by the Motor Truck Sales Managers' Association at a dinner given by the Chicago Automobile Trade association here tonight.

The trip was the best demonstration of the truck ever attempted. It knocked down sales resistance and left the open door for the dealers in these sections. When four trucks with five less men can go into a field of shocked oats and replace eleven teams in hauling bundles to a threshing outfit, the farmer is convinced. Demonstrations like this and of long-distance hauling were staged in almost all of the ninety towns visited.

Few Farmers Own Trucks

Only 3 per cent of the farmers own trucks today. The sales possibilities are great for those who will take advantage of the opportunity. This tour has proved that the farmer can be convinced by practical demonstration.

As a direct result of the success of this tour, the dealers of Des Moines, Iowa, have organized a tour which will start from there on Oct. 13 and will make a 500-mile trip through the sections of Iowa adjacent to Des Moines.

G. M. C. GETS DELCO LIGHT PLANT

Dayton, Ohio, Oct. 16—The General Motors Corp. has purchased the Domestic Engineering Co. This company, incorporated in 1916, has \$1,200,000 of common and \$2,107,000 of an authorized issue of \$2,300,000 of 7 per cent cumulative preferred stock outstanding. The company manufactures Delco light plants, and has a plant capacity of 30,000 units a year.

The officers of the company are: President, Col. E. A. Deeds; vice-president, Charles F. Kettering; secretary and treasurer, R. D. Funkhouser; general manager, Richard H. Grant.

Service Men Meet Nov. 10

Program of Discussions Is Given
Out by N. A. C. C.

Body Will Pay Expenses of Factory
Men to Convention

DETROIT, Oct. 10—The first national gathering of service managers will be a two or three-day session at Detroit the week of Nov. 10.

That the National Automobile Chamber of Commerce, which is fathering the convention, plans to make it most valuable to the service men in attendance is attested by the list of twenty-two subjects listed for discussion. This list has been sent to every member of the N. A. C. C. with the request that the subjects considered of greatest importance be indicated and other additional topics suggested.

Factory Service Men to Talk

It is probable that the majority of subjects under consideration will appear on the final program as the basis of talks by factory service managers and others best fitted to lead in the discussion. The N. A. C. C. considers the convention and a probable service managers' association which may grow out of the meeting so important that it has arranged to pay the mileage expenses and a fee of \$10 per day to representatives from each factory. Arrangements also are being made for the service men to visit the plants of several of the Detroit manufacturers.

Here is the tentative list of subjects to be discussed:

1. "Recommendations of National Automobile Chamber of Commerce Committee on Revision of Service and Repair Parts Policies."
2. "Service Relations between Accessory Manufacturers and Vehicle Manufacturers, the Distributer, Dealer and Owner."
3. "Service Relations between the Parts and Assembly Manufacturers and the Vehicle Manufacturer, the Distributer, Dealer and Owner."
4. "Should the Factory Encourage Service by Independent Garages and Service Stations?"
5. "The Organization and Functions of a Factory Service Department for Maximum Service Efficiency."
6. "The Functions of Direct Factory Service Representatives in the Field."
7. "The Improvement of Vehicle Design and Quality Through Service Records."
8. "Factory Service to Owners of Large Truck Fleets."
9. "What the Dealer Requires from the Factory Service Department."
10. "Distributors' and Dealers' Responsibility for Rendering Service on Cars Purchased Outside of the Territory."
11. "Plan for Regulating Distributors' Parts Stock Supply to Assure Adequate Assortment and Maximum Activity."
12. "Pirate Parts—Factory Control of the Source of Supply of Spare Parts and Material."

13. "The Development and Standardization of a System of Service Stations."

14. "The Design and Lay-out of Efficient Service Stations."

15. "Proper Routine Systems and Records for Handling Repairs."

16. "Selection and Development of Service Executives and Technical Men."

17. "Training of Mechanics and Incentive for Increasing Their Efficiency."

18. "Lowering the Repair Costs and Improving Quality by Efficient Methods and Labor-Saving Tools."

19. "The Extent to Which Service to Customers Constitutes Good Business."

20. "What is the Most Efficient System of Estimating Charges to Customers for Repairs?"

21. "Selling Service to the Customer."

22. "The Necessity for the Inauguration of an Educational Program Emphasizing the Responsibility of Vehicle Users as Regards Care and Operation."

Parts Makers in Merger

Spicer Mfg. Co. Buys Out Two
Big Firms in Combination

Plans to Increase Output But Plants
Will Be Independent

NEW YORK, Oct. 12—The merger of three large parts companies has been announced in financial quarters here. The combine is headed by the Spicer Mfg. Co. of South Plainfield, N. J., makers of universal joints and shafts, and includes the Sheldon Axle & Spring Co. of Wilkesbarre, Pa., and the Parish Mfg. Co. of Reading, Pa., makers of axles and frames.

Rumors link up the names of several other companies as concerned in the deal, but the advertisements of bankers, offering an issue of \$3,000,000 of 6 per cent serial gold notes for the Spicer company, speak only of the three concerns mentioned. The Spicer company also has announced that negotiations are under way for the purchase of a large plant, with facilities covering sixteen acres, at Pottstown, Pa.

Additions are contemplated to the Parish and Sheldon plants, although it was said the management and policies of each would remain unchanged. The Spicer company has purchased 85 per cent of the Sheldon stock, while the entire stock of the Parish company has been absorbed, it was announced. Net earnings, before Federal taxes, for the three companies during the fiscal year 1918-19 were given as \$3,286,545. The Spicer issue has been underwritten by Merrill, Lynch & Co. of New York, and Cassett & Co. of Philadelphia.

OAKLAND TO INCREASE OUTPUT

Pontiac, Mich., Oct. 16—The Oakland Motor Car Co. proposes to build 100,000 cars in 1920. Plant extensions costing \$2,000,000 are to be made at once. These do not include the \$250,000 administration building now being erected.

Name Garage "Fair List"

Washington Club Starts Plan of
Recommending Repair Men

A. A. A. Watches Experiment With
View of Further Adoption

WASHINGTON, Oct. 12—Other cities may be interested in the proposal to establish a "fair list" of motor car repair men and service stations in the District of Columbia which was suggested by William Ullman, secretary of the District of Columbia Club of the American Automobile Association, as a means of doing away with profiteering in automobile and service.

The Ullman suggestion does not include promulgation of anything resembling a "blacklist," but merely proposes that service stations and repair men who render first-class service at reasonable prices be included in a fair list for the guidance of motorists.

Would Prevent Profiteering

Many members of the local club, believing that profiteering is being practiced by some local repair men, according to Mr. Ullman, have brought to him facts and figures on which their belief is based, and have demanded that the organization formulate some plan to check the alleged profiteering. The fair list, he said, would include names and addresses of establishments willing to give good service at reasonable prices, and such lists would be posted and recommended to motorists, upon receipt of any statement or guarantee that proprietors of the places cared to make to the A. A. A.

DETROIT GETS BIG PARTS HOUSE

Detroit, Oct. 10—Plans for a mammoth parts exchange which will house the products of factories from every corner of the globe and centralize the industry in this city, were completed following consummation of negotiations whereby Charles F. Van Sicklen secures a fifteen-years' lease on the eight-story service building of the Ford Motor Car Co., at a rental approximating \$4,000,000. The Stormfultz-Loveley Co., which took over the building from the Ford Co., leased the building to Van Sicklen and the former company will act as building manager.

The idea of concentrating the world's products in one gigantic exchange was conceived by Van Sicklen after numerous conferences with leaders in the steel industry, as well as the auto trade, all of whom emphasized the desirability of Detroit as the location for such an institution, the necessity for which is becoming increasingly apparent. The necessity for purchasing agents to visit widely separated cities and countries in selecting equipment prompted the idea, the saving of time and money, in the opportunity furnished for inspection of the world output in the one building, insuring the success of the enterprise.

Dealers Plan National Motor Day

Directors' Meeting at Denver Brings Out Much Important Work for N. A. D. A.

DENVER, COL., Oct. 10—A "National Motor Car Day" to be observed by motor vehicle parades, 4-minute speeches and other methods of centering the attention of the public upon the motor car as a transportation unit, was voted for by the directors of the National Automobile Dealers' Association at their four-day conference in Denver and Estes Park. The day is to be designated later, and the plan calls for enlisting the support of trades organizations and papers throughout the nation toward making the event a great success in every city.

Promised Freight Cars

Another important accomplishment of the conference was securing an official statement from Director General of Railroads Walter D. Hines that steps are being taken to remedy the shortage of freight cars for shipping motor cars. This statement from Mr. Hines came in response to a telegram sent by President F. W. A. Vesper of the association detailing the heavy financial loss incurred

by dealers, and the inconvenience to customers because manufacturers are unable to obtain freight cars for prompt shipments.

The Townsend bill for federal highway construction and maintenance, the Dyer-Newton bill for a rigid federal law against car thefts, the Pittman bill for unlimited inter-state recognition of motor licenses and the measure pending in congress to amend the Volstead prohibition law so a dealer's interest in an unpaid-for car confiscated for carrying liquor shall be protected, were endorsed by the directors. Favorable reports concerning the progress of these measures were also received from Washington.

Protest Against Dealer License

A resolution was adopted against a bill proposing to license all manufacturers, jobbers and dealers, and another was adopted condemning North and South Carolina laws providing forfeiture of a motor car if the car injures a per-

son other than the owner. This was held to be confiscation.

Voluntary offers from several of the largest distributors and dealers in big cities to establish an endowment fund to extend the activities of the association were reported by Pres. Vesper, and the directors authorized the creation of a special sustaining membership to provide for accepting these donations.

Plans to gain better protection in general for the interests of car dealers and owners and to bring about closer co-operation among motor trades bodies were also worked out.

Detroit Show a Winner

Big Crowds Attest Interest in Closed-Car Salon

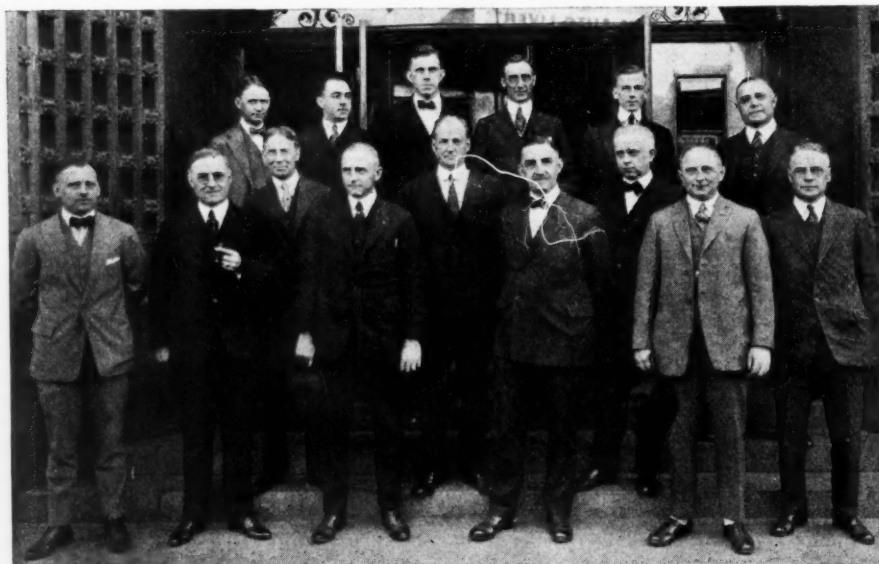
Dealers Believe Event Surpassed National Exhibits

DETROIT, Oct. 11—Successful beyond the most sanguine expectations, Detroit's first car salon from the standpoint of sales, is said to have blazed a new path, the orders booked far exceeding those of any show ever held here and convincing dealers that the enclosed body is to be the car of the future. Designed primarily to attract the exclusive set and with every detail in stage setting and decorations and even the apparel of the salesmen and attendants, carrying out that idea, the salon proved the mecca for thousands of wage earners, many of whom left their orders for the medium-priced cars and in a few instances for the more expensive ones.

A. L. Zechendorf, president of the Detroit Automobile Dealers' association, under whose auspices the exhibition was held, was enthusiastic in his praise of the salon and his expression was endorsed by practically all of the dealers. Slight fears held by some dealers that an exclusive closed-car show might not succeed, quickly were brushed away when on the opening night a line extending through the lobby of the Arena Gardens and onto the sidewalk, awaited the opening.

Couzens Opens Show

Throughout the opening night and during every afternoon and evening this week, smartly gowned women thronged the salon and when the doors closed at 10:30 tonight the venture was voted a remarkable success and a tribute to the foresight of the progressive leaders in the dealers' association. Mayor James Couzens, whose handsome \$8,000 Packard Imperial limousine, direct from the factory, occupied a place of prominence in the Packard exhibit, switched on the lights and delivered a short speech opening the salon Monday night and without further ceremony visitors began winding their way among the cars, in most instances hunting out the car they favored when they entered the arena.



N. A. D. A. DIRECTORS AT CONVENTION

First row, left to right: Harry G. Mook, St. Louis, Secretary and Business Manager; Director J. A. Graham, Minneapolis; Directors A. E. Maltby and W. J. Brace, Philadelphia and Kansas City, Executive Committeemen from Grand Eastern and Grand Central Divisions; Treasurer Thomas J. Hay, Chicago; President F. W. A. Vesper, St. Louis; Directors George D. McCutcheon, Atlanta, and A. E. Mitzel, Canton; Director P. E. Chamberlain, Denver, Executive Committeeman from Grand Western Division.

Second row, left to right: John E. Smith, Atlanta, with Director McCutcheon; Vice-President Harry D. Austin, Seattle; General Attorney C. A. Vane, St. Louis; Director P. H. Green, Los Angeles; B. B. Hudnall, St. Louis, Assistant Business Manager; Louis C. Block, Philadelphia, with Director Maltby.

The cars were not placed as in the usual motor show and the decorations and settings were superior to those of the annual exhibit. Each car was identified with a neat card and the machines were distributed indiscriminately.

SET DATE FOR HOUSTON TESTS

Houston, Tex., Oct. 10—The Houston Chamber of Commerce has officially designated Nov. 11 to 13 as the days on which the rice tractor and power farming demonstrations will be held here. The demonstration originally was carded for early in October, but the fact that many manufacturers would be unable to show at that time, combined with the fact that much of Texas had suffered from a gulf storm, caused the postponement.

Helps Detroit Shipping Regional Director Aids Makers in Getting Freight Cars

Works in Co-operation with Factories in Securing Equipment

DETROIT, Oct. 12—Uninterrupted traffic from Detroit and Michigan motor factories within the last month, taking care of all demands to the entire satisfaction of everyone, has emphasized the wisdom of the action of the United States Railroad Administration in assigning an automotive traffic director to Detroit to see that every manufacturer in the district was given fair play in getting railroad equipment.

Insistent demands of certain manufacturers three months ago for equipment for handling their output and frequent complaint that certain members of the trade were being favored, resulted in the establishment of a traffic office here with C. H. Ketcham, widely known in railroad circles in charge and acting under the direct supervision of regional Director A. F. Hardin, of New York.

Aids Makers in Getting Cars

Ketcham, whose work has taken him over most of the United States, served on the staff of Director Hardin during the war and came to Detroit thoroughly familiar with the situation. His first effort was to familiarize himself with the conditions at the various plants in the Michigan territory, particularly as regarded the needs of the motor car business. The next step was to systematize the distribution to give the Detroit territory all the equipment necessary for the proper handling of the output.

In other words if Flint wanted 200 cars, Lansing 300 and Detroit 1000 during any particular month, Ketcham made arrangements to have that equipment available. Although working in an executive capacity and having nothing to do with the detail, one of his duties was to see that no particular plant was favored and that the equipment was divided on a percentage basis, where there was any question regarding distribution.

To Prosecute Motor Car Thieves

Rocky Mountain Dealers, in Convention, Raise Fund

COLORADO SPRINGS, COLO., Oct. 12—With more than 800 motor car and accessory dealers from the eight states comprising the Rocky mountain region in attendance, the third annual convention of the Rocky Mountain Auto Trades association came to an end here this week.

The convention was opened Oct. 6. The first business transacted was by the board of directors which, in a special meeting, voted to recommend to the new board of directors a proposition providing for a special fund to be used for the employment of a special attorney to prosecute motor car thieves who steal from any of the dealers in the territory. The new board was elected Tuesday, and was asked to create the fund immediately.

The second day of the convention opened with the reading of reports by the committees, and to the discussion by the members of the association of the various topics regarding trade problems. F. W. A. Vesper, president of the National Automobile Dealers' association addressed the delegates at a luncheon meeting, at which L. C. Brock, president of the Philadelphia Auto Trades association, and Edward S. Jordan, president of the Jordan Motor Car Company of Cleveland, also spoke.

S. E. Norton, president of the Denver Auto Trades association, spoke on the Kenyon highway bill which is now before

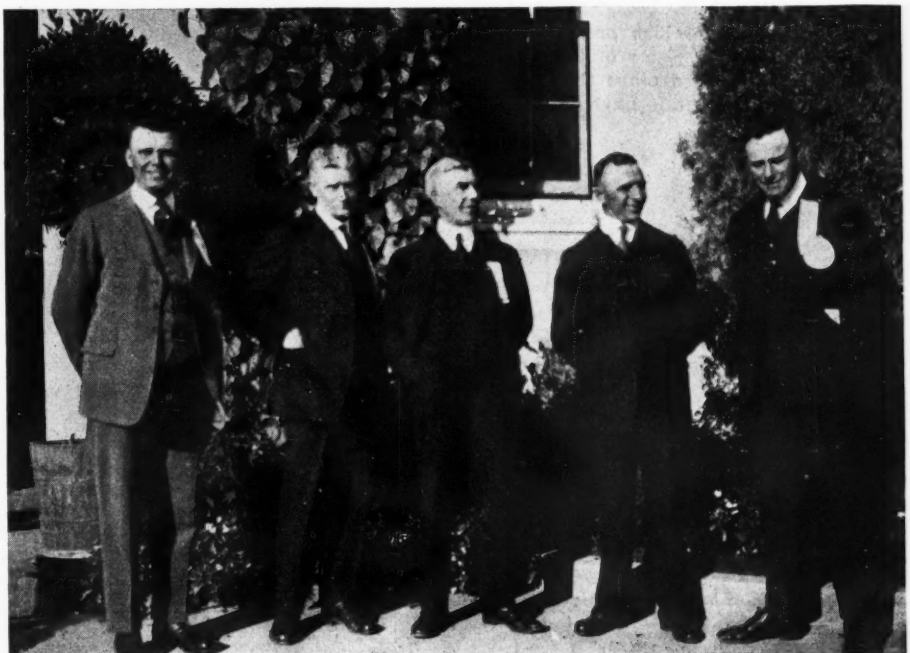
Congress, and urged the members of the association to support the measure. He declared that the adoption of the bill would mean very much to the automotive industry in aiding its growth and development.

ST. LOUIS TIRE MEN ORGANIZE

St. Louis, Oct. 12—The St. Louis Tire Dealers' association is the newest organization here. The purpose is to promote friendly co-operation, better trade conditions and standardized business methods. These tentative officers have been elected: Chairman, Albert A. Sacks, Reliable Auto Tire Co.; secretary, E. G. Hefter, Great Western Tire Corporation. A committee to draw rules and regulations was adopted as follows: Ralph Hirsch, Hirsch-Alzheimer Tire Co.; G. A. Caine, Caine-Cooper Service Co.; Joseph Roberts, Roberts Motor Tire Co.; S. L. Chorlins, Independent Tire Co.; Joseph Sacks, Reliable Auto Tire Co.; Art B. Mooney, Art B. Mooney Tire Co., and Morris Stifelmann, Liberty Tire & Supply Co.

OFFERS REWARD FOR THIEVES

Des Moines, Iowa, Oct. 12—Motor car thievery has become so prevalent in northern Iowa that the county board of supervisors in Emmett county, of which Estherville is the county seat has made standing offer of \$200 for the capture and arrest of any person stealing a motor car from a resident of the county.



Officers of Rocky Mountain Auto Trades Association—Left to right—J. A. Wikoff and A. R. Davis, vice-presidents; Finlay L. McFarland, president; L. R. Bach, treasurer; Harrison Goldsmith, secretary and business manager.

Making Lead Battery Parts

Moulds Afford Ready Means By Which Service Station Can Cast Own Connectors, Plate Straps and Other Parts

WITH the moulds shown herewith the battery service station, especially the small-town establishment, can cast its own parts, such as connectors, terminals, pillar posts and straps.

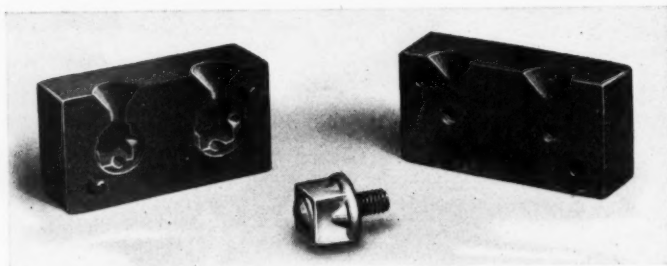
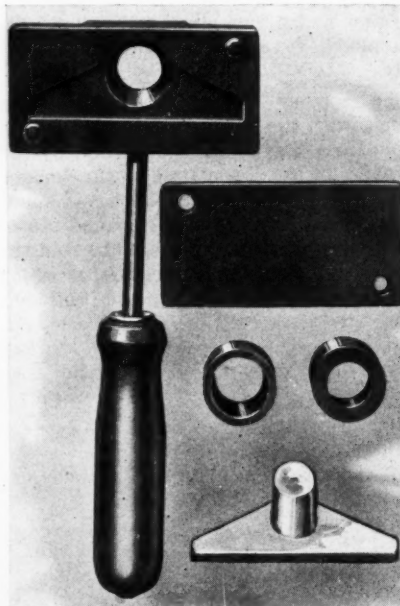
Besides the utilization of scrap lead which is now sold to the junk man, the use of these moulds enables the service station to send out repaired or rebuilt batteries looking like new. Inasmuch as the looks of the battery is the only thing by which the owner can judge the quality of the workmanship this becomes a big factor. The moulds also effect a saving in time as new parts can be cast from old material in much quicker time than it takes to clean, scrape or brush the old parts preparatory to burning.

A battery shop properly fitted out with means for casting its lead parts need not worry about keeping the stock bins full, because it becomes a relatively easy matter to cast enough parts in a few hours to last a long time. An inexperienced man can turn out new lead parts which have every resemblance of the factory made variety.

The plate and grid molds are intended for large establishments, where complete batteries and plates are to be made. These moulds are made in either surface or staggered pattern.

Tendency to stick to the moulds has been overcome by making the molds out of an alloy called ferro-silico-mangan, having an iron base alloyed with silicon and manganese. It is declared the care with which this is compounded precludes the possibility of its being affected by the sulphates and oxides present in all scrap battery lead. Some of the battery service station men declare that moulds made of the base metals have a tendency

Many dealers have held off on battery repairs because of the difficulty at times of getting connectors, terminal screws, pillar posts and straps, etc. On these pages are shown moulds by which even an inexperienced man can cast battery parts from scrap lead. This means a saving in time and besides the finished battery will look like a new job. It is human nature to judge workmanship by outside looks, so the better a battery can be made to look the better pleased is the owner.



Here are three moulds for battery parts. Above, pillar post and plate strap mould, which makes the straps long enough to accommodate any number of plates up to and including the number of negatives required in the fifteen-plate assemblies. At the left is shown a screw head mould. Every battery man will appreciate the difficulty of driving home a badly worn or cut terminal screw. The lower half of the mould is drilled and tapped for the popular 5-16 and 3-8 in. size. Right, connector mould, which comes in seven, nine, eleven, thirteen and fifteen plate assemblies. At slight extra cost the dealer's name or initials can be engraved in the mould.

to etch when exposed to sulphuric acid or its salts.

It is possible for the dealer to get these moulds with his name or firm name engraved into the connector moulds, so that the name will appear on the finished article in raised letters. These moulds go under the name of Master Craftsman and are made by the Associated Electric Service Stations, Chicago.

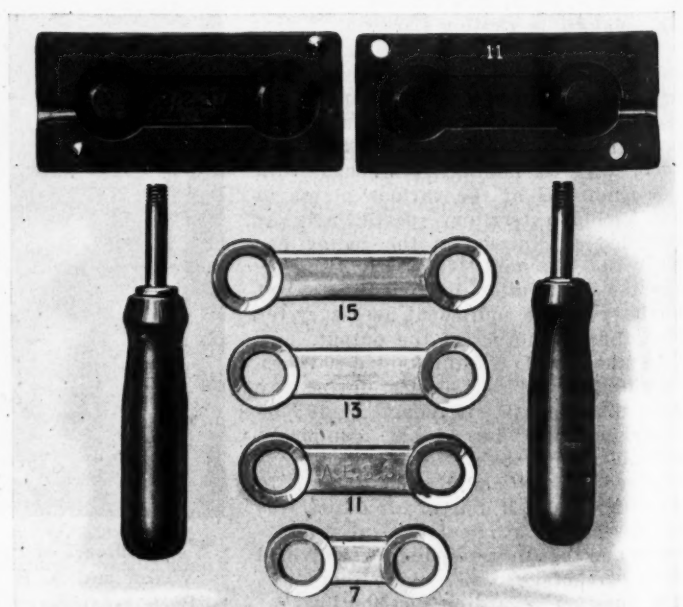
The Craftsman moulds are accurately tooled and machined and fitted with composition heat-proof handles. Heretofore the battery repairman has been dependent upon die makers to make moulds to order and frequently such moulds were not satisfactory, as there are some delicate problems of air clearance and shrinkage connected with the making of them. The ordinary die-maker is not sufficiently acquainted with lead moulding to figure these and that is probably one of the chief reasons why most of the home-made variety of moulds have fallen down on the job.

One of the things to be noted in connection with the strap mould is that the post is cast without the comb. The reason this is that results have shown a better job is possible if new plates are assembled in an accurately spaced burning rack, rather than in a more or less inaccurate strap comb.

HOW THE MOULDS ARE USED

1—Preference is to be given scrap lead parts such as pillar posts and straps, connections and terminals, although old battery plate scrap may be used by first thoroughly breaking up the plate and cleaning out all the active material, using the grid only.

2—Melt the parts in a plumber's melt-



ing pot or any iron kettle, melting the mass to a temperature that will cause it to glow a bright cherry red, when in a dark place. The addition of $\frac{1}{4}$ lb. baking soda to 20 lbs. lead, thoroughly stirred in, will prolong the life of the mould by neutralizing the action of the sulphates and oxides present in all scrap battery lead.

3—Preheat the mould to a temperature equal to that of an overheated soldering copper.

—Smoke the inner face and cavities of the mould with acetylene, lamp or candle smoke, or dust with powdered, not flake, graphite.

5—Clamp the moulds snugly, but not too tightly in a vise or C-clamps.

6—Dip enough lead into a ladle for one casting only. Pour rapidly but not too quickly to trap the displaced air.

7—Allow the casting to cool from 15 to 30 sec. and open mould.

8—The casting should fall from the mould if not allowed to chill too long. Should the parts stick, a few sharp taps upon the lead part, not the mould, will free it.

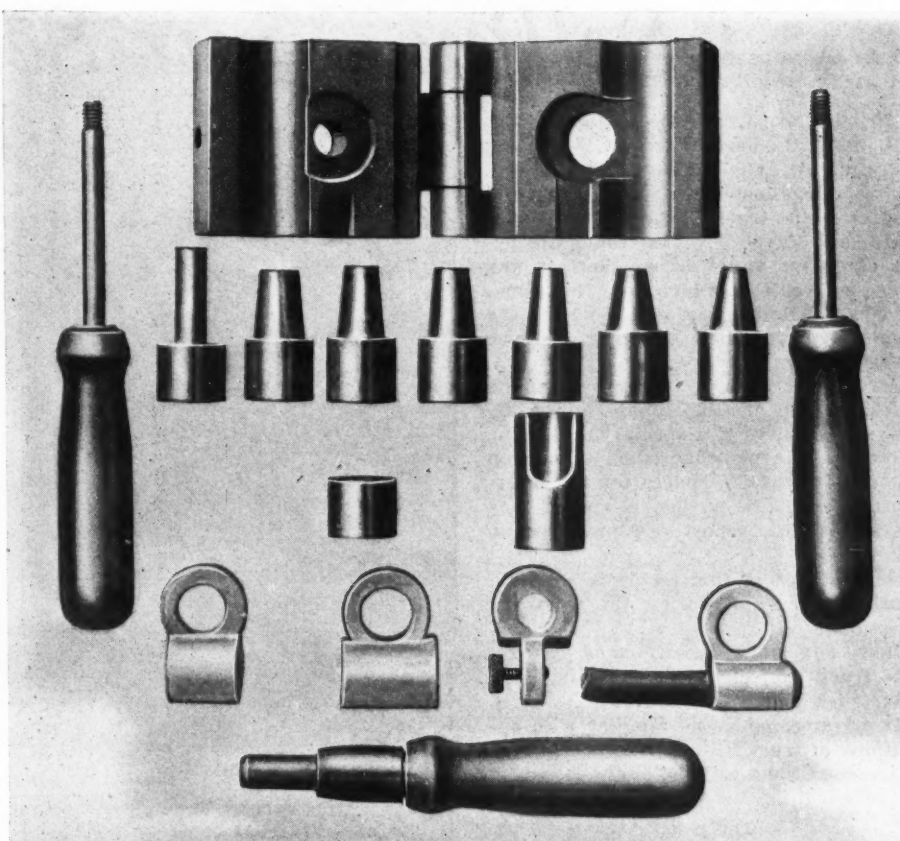
Battery in Cold Weather

NOW is the time for dealers, especially those in sections of the country where cold weather will prevail for several months to think about taking care of customers' storage batteries. Electrical systems of motor cars do not function as well in cold weather and much of this can be traced to the condition of

A fully charged battery will not freeze.

Electrolyte in a battery will freeze at various temperatures, according to the specific gravity of the cells, as follows:

Specific gravity 1.120, battery empty, will freeze at 20 deg. above zero.



This mould is designed to produce sixteen different terminal lugs, including the Exide U-bolter as used on the Buick. At the bottom is shown a neat form of lighting terminal. It is stated that with proper care to preheat and smoke the mould, terminals of excellent quality and appearance are possible from scrap lead.

Specific gravity 1.160, battery three-quarter discharged, will freeze at zero.

Specific gravity 1.210, battery one-half discharged, will freeze at 20 deg. below zero.

Specific gravity 1.260, battery one-

quarter discharged, will freeze at 40 deg. below zero.

If you get a battery in which the electrolyte has been frozen, place the battery in a warm place and it very often will come back to its normal charge. It should then be charged and the old electrolyte poured out and fresh electrolyte of 1.300 gravity poured in.

Electrolyte or battery solution is made as follows:

1—A lead-lined tank or glazed stone vessel should be obtained.

2—Fill the vessel about two-thirds full of distilled water.

3—Mix chemically pure sulphuric acid, 1.840 specific gravity, with the water in the proportion of 2 parts of acid by volume to 5 of water.

4—Fill a hydrometer syringe with acid and add it to the water by holding the nozzle under the surface of the water. Stir the solution with a glass rod.

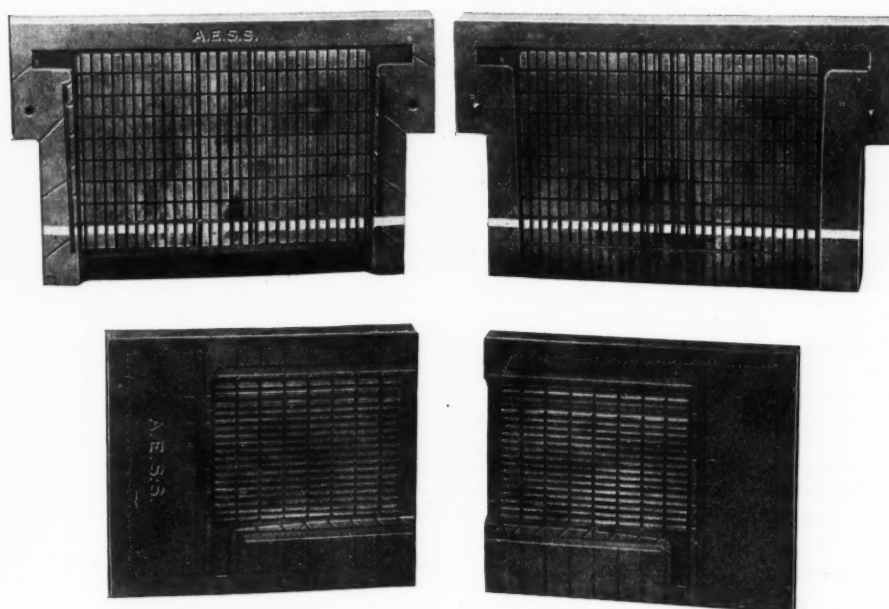
5—Rinse the syringe and test the strength of the solution. If it is about 20 deg. Baume allow it to cool, when it will be stronger.

6—Four parts of water to one of sulphuric acid by liquid measure gives a strength of 22 deg. Baume, at 60 deg. F.

7—If not strong enough add more acid. if too strong add water.

8—The usual strength required is 25 deg. Baume, or 1.200 specific gravity.

9—Do not let the pure acid remain in the hydrometer. The hydrometer is correct at 60 deg. F.



This shows the mould that makes the grids for battery plates. These moulds are intended only for the bigger shops that make complete batteries, or that specialize on plates. They come in either the surface or staggered patterns.

Selling Your Service

By K. Herrick

MENTION of field inspection as coming under the head of service, was made early in this article. The Packard company employs inspectors to follow up and inspect motor truck fleets and individual units sold, to see how the trucks are being cared for and whether there is any abuse of vehicles which may be remedied by politic suggestions. Some of the inspectors specialize on long distance transportation.

An effort is made to inspect customer's trucks once a month. Where this is arranged for, there is a special sheet form, known as the monthly truck inspection report. It contains spaces for the insertion of numbers having a special key meaning. This report is reproduced on this page.

On the back of this report is a "confidential report" answering the following questions:

- Does not truck receive good care?
- Is truck subjected to overloading?
- Is truck subject to abuse?
- Is driver capable and familiar with operations of truck?
- Are conditions satisfactory?
- Are conditions unsatisfactory? If so, why?
- How long has driver been on this truck?
- Has driver had previous Packard experience?

This confidential report is to enable the company to find out, in case of complaint, whether the work on a truck or whether the driver is to blame. It also enables the inspectors and the service manager to know when there is an opportunity to help the customer and driver by having real service given to trucks and to prevent and correct abuses, which will result in more satisfaction to the customer and less needless trouble to the service department.

This is the fourth and final of a series by Mr. Herrick describing the successful service salesmanship methods employed by the Packard Motor Car Co. of Philadelphia.

The company has a battery recharge tag, a manila form with a detachable stub at the bottom for the customer.

In the Electrical Shop

The electrical shop, on the seventh floor of the Packard building, is in a space 20 by 20 ft., like other divisions on this floor securely protected by heavy wire partitions and gate with spring lock. Work benches run around three sides of the shop, each equipped with the usual outlay of tools and apparatus. A test table, six feet by eight, designed in the local Packard shop, occupies the central space, with plenty of clearance between it and the work benches. This table is so equipped that it can test any part of a car's electrical system as a unit, or test all parts of its entire electrical system at once while assembled on the table. The system of every car sent to the shop

Form 277 6-19 AM
Page 1, 2

MONTHLY TRUCK INSPECTION REPORT

me..... Model..... Date.....
Address..... Motor No..... Del'y'y Date.....

KEY

- | | | |
|------------------------|-------------------------|---------------------------------------|
| 1. O. K. | 5. Needs slight repairs | 9. Improper lubrication |
| 2. Should be adjusted | 6. Needs exten. repairs | 10. Can only report after dismantling |
| 3. Should be tightened | 7. Should be overhauled | 11. Should be cleaned |
| 4. Should be rebushed | 8. Should be renewed | 12. See General Remarks |

UNIT	Req. Atten.	Atten. Given	UNIT	Req. Atten.	Atten. Given	UNIT	Req. Atten.	Atten. Given
MOTOR			CLUTCH			TORQUE ARM		
Main Bear.			UNIV. JOINTS			REAR AXLE		
Conn. Rod B.			TRANS. Gear Shift			FRONT AXLE		
Valves			SPRINGS R. Front			SELF STARTER SYSTEM		
Governor			L. Front			HORN		
Wiring			R. Rear			WINCH		
Magneto			L. Rear			HOIST		
Carburetor			Spring Clips			RADIATOR		
Oil Pump			Spring Shack.			FRAME		
Water Pump			Spring Bolts & Bushes			HOOD		
Water Plugs			Spring Hanger Brackets			HUBDOMETER		
Water Hose			WHEELS Front			MUFFLER		
Battery			Rear			OIL CUPS		
Fan. Assemb.			TIRES Front			GREASE CUPS		
Accel. Assemb.			Rear			FENDERS Right		
Front End Gears			BRAKES Foot			Left		
Cylinders			Hand			LAMPS Dash		
Carbon			RADIUS RODS			Tail		
Oil Level						TOOL BOX		
Compression						BATT. BOX		
Coil								
STEERING Post								
Connections								
Conn. Rod								

PACKARD MOTOR CAR CO. OF PHILA.

Inspector.....

Form 27 6-19 AM Page 2

PACKARD MOTOR CAR CO.
OF PHILADELPHIA.
BATTERY RECHARGE TAG

Date **B. O. 13362**

Type Battery.....

Owner.....

Address.....
(or Repair Order No.)

Date Promised.....

Work Ordered by.....
(Owner or Order Taker sign here)

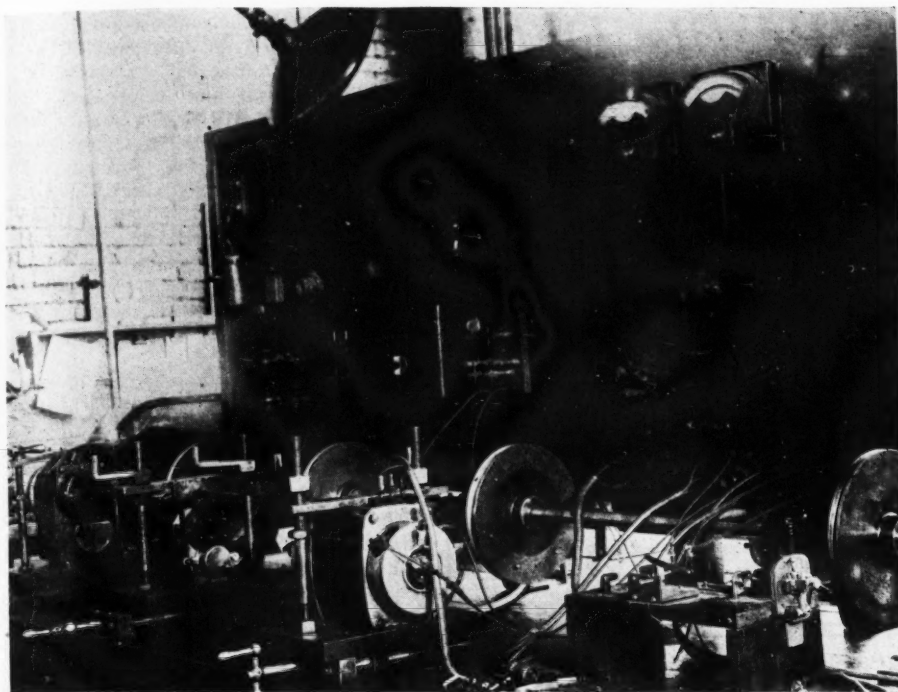
Date Delivered to Owner.....

PACKARD MOTOR CAR CO.
OF PHILADELPHIA.
B. O. 13362

THIS TICKET MUST BE PRESENTED WHEN CALLING FOR BATTERY.

Battery recharge ticket

Monthly truck inspection report. A "confidential report" is printed on back of this form



Magneto test table in Packard electrical shop

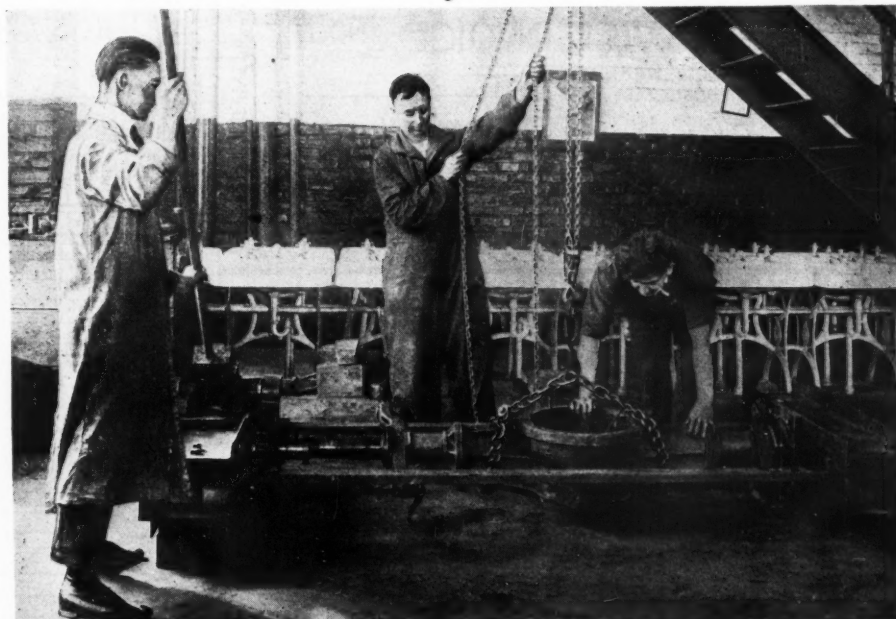
for electrical work, is thoroughly tested on this table before being reassembled in the car.

An upright panel, or back board, three feet by seven, is equipped in front for testing armatures and in the rear for testing starting and condensing systems. The table runs on a lathe and is started low on the left by a small switch. The motor is one horsepower. Meters, adjustable spark gaps and connections on the panel are assembled in the usual way. The department contains a drill made by the employees out of salvage parts, that were lying around the shop, until the suggestion was made by one of them that these parts could be utilized.

Machine Shop and Tool Section

The machine shop, also on the seventh floor, is partitioned off in the same manner as the electrical shop. Only three expert machinists are allowed within the enclosure at one time, except in emergencies, so that there is plenty of room for work and as little confusion as possible. No mechanics from other parts of the department are admitted. Here are two arbor presses, one of 20 tons to press out steering knuckles or other mechanisms too heavy to press on the other machine, which is a ten-ton affair and used largely on piston pins, bushings and the like. Here also are found a 22-inch and an 18-inch radial drill, two high-speed, sensitive drills, three lathes, 18, 16 and 10 inches respectively, the last-mentioned for high-speed work; No. 2 planer, a 12-inch power hacksaw, a 14-inch Steptoe shaper, two emery grinders and one or two reserve arbor presses and drills.

In the tool section of the shop are three 5-foot pyramids made of varnished hard wood and fitted with brackets for the convenient display of such small tools as may be immediately needed at once. These include dies, drills, top reamers, pullers,



50-ton compound screw press invented and built in shop

counterpin bolts and nuts on two of the pyramids, while on the third, which is for heavier parts and therefore made to revolve, are such units as piston pin-pullers, pinion gear-pullers, piston ring bands, drifts, clutch dog-pullers, heavy socket wrenches and bolt cutters.

These pyramids are deemed better than cabinets for this class of tools which are used constantly and therefore should be at hand for quick action.

There is a rack at the lower end of the shop for shim steel and shim brass; a roller for gasket paper; a large cabinet on the south wall for new stock, excess tools and solders and three 120-gallon tanks for transmission oil, cylinder oil and kerosene.

On this floor also are the radiator room and tinsmiths, equipped in the usual manner with stock machines. There is a "No-Crack" tank for cleaning motors and motor parts, three and a half by five and a half, by three feet deep. This is heated by gas. The blacksmith shop, 40 by 20 ft., also partitioned off by wires, is on this floor.

There are also small returned goods and stock departments on this floor. In the front portion of the floor are assembled the passenger cars to be worked on.

Where Motor Trucks Are Repaired

On the eighth floor, where motor trucks are repaired, the front space is for the line up of trucks waiting to be worked on and those which already are in work. While the bulk of the work is prepared in the shop already described, on this floor is a notable machine, designed by Ireland and built in the shop. It is a fifty-ton, compound screw press with a ratchet and lever motion, operated by one man, who can do as much work with this contrivance in three hours as it formerly took five men three days to accomplish.

This press has a variety of uses in-

cluding straightening frames, rears and axles. When axle tubes are pushed in, about 40 tons' pressure is applied. The head of the press is stationary and extension is made by means of a threaded gear and slot. The press consists of head foot and cross-bars as its principal frame parts. An overhead rail and chain hoist permits the comparatively easy placing of the unit to be straightened or pressed in the machine. It is the only horizontal press known. This fact, it is claimed, makes it much easier to operate, the whole being close to the ground.

On the ninth floor is the company restaurant, divided into two dining rooms, one for the mechanics, seating 160 men at a time.

by the service office signifies the job is ready for invoicing.

The costs of the job are determined from time cards and material requisitions. These show the wholesale and retail costs, what the expenditure is for and who authorized it.

The time card is made up in one copy while the material requisition is in duplicate. The original is priced and sent through to the service office or place of invoicing and the duplicate retained by the stockroom to deduct from its inventory record.

Filing Envelope Is An Aid

To save an additional form, a summary of the work order showing costs and distribution of labor and material is printed on the outside of the filing envelope. This also facilitates future reference to the job. The form is such that costs can be shown for all departments which the service station may have. All costs for the service invoice and for the accounting

IN THIS SERIES

Service Profits Depend on—
THE ORGANIZATION
ROUTING OF JOB
BUILDING LAYOUT
EQUIPMENT
PARTS STOCK
STOCKROOM
SERVICE RECORDS
REPAIR CONTRACTS
STOCKROOM SYSTEM
MASTER SHEET
COST DETERMINATION

department can be secured direct from this form.

An efficient service station can control the cost of labor on a job but it can not control the cost of parts. The service invoice should take this fact into consideration. To stamp this clearly on the customer's mind, the labor charges can be shown in red. This form is made up in duplicate, the original going to the customer and the duplicate being retained by the accounting department for its records.

The service invoice and the filing envelope are cross referenced to assist in locating the order at a future time should occasion arise.

200 ARMY CARS BRING \$45,490

Washington, Oct. 11—Two hundred unserviceable motor vehicles, chiefly Dodge Bros.' cars and Nash-Quad trucks were sold for \$45,490 at Camp Holabird, Baltimore, Md. A large crowd was present and bidding was lively. Additional sales will be held each Thursday at Holabird until all the unserviceable vehicles have been sold, and about 200 will be offered for sale each week. Next week's list includes Dodge Bros.' cars and Peerless, Nash and Garford trucks. Eighty-four Ford passenger cars and trucks, Pierce-Arrow, Nash and Kissel Kar trucks and Indian motorcycles will be sold Oct. 17 at Camp Meade.

Official reports received by the Motor Transport Corps from ten sales held at different camps show that \$58,960 was realized from 270 vehicles, including 218 cars, trucks and ambulances and fifty-two motorcycles and bicycles. The range of prices has been wide, running from \$1.00 for a Chevrolet car to \$2,200 for a Kelly Springfield truck.

ENGINEERS TO AID WAR DEPT.

Washington, Oct. 6—The Ordnance Department has arranged with the Society of Automotive Engineers to combine the engineering talent of the automotive industries of this country so that American military requirements may be developed in times of peace as well as of in times of war. A Committee of Automotive Engineers will sit at the Technical Staff of the Ordnance Department in discussions on the design of all motor equipment, including tanks, tractors, etc. A board has already been organized of civilian engineers and a meeting has been held with ordnance engineers during which a program for the future was laid out and it was arranged that meetings of the combined Engineer-Ordnance Board would be held every two months.

NOVELIST GETS CREDIT FOR TANK

London, Oct. 7—H. G. Wells originated the idea of the tank. A British commission today heard claims to the invention of the armored device which was such a vital aid to the allies, and in the course of the session War Minister Churchill said Mr. Wells had first written the idea of the tank long before the war.

NAME _____
 ADDRESS _____
 MODEL _____ ENGINE NO. _____
 DATE _____ W.O. NO. _____
 INVOICE No. _____ EST. _____
BRIEF OF WORK

TIME CARD				
EMPLOYEE NAME OR No. _____		W.O. No. _____		DATE _____
DESCRIPTION OF WORK.				
START				
FINISH				
ELAPSED TIME	SALARY RATE PLUS-OVERHEAD	LABOR RATE	O.K.	

LABOR			MATERIAL			TOTAL		W.O. NO.
DEPT.	HRS.	COST	LIST	COST	LIST	COST	LIST	
S								
M								
C								
A								
TOTAL								

Summary of job form is printed on outside of filing envelope. All forms pertaining to job go in this envelope as it is invoiced from this record. Departments are indicated by letters. Costs shown in distribution columns. Size 8 by 11 in.

(Insert) The time card goes to serve office and is filed in filing envelope when work is completed. It is made up in a single copy. Size, 4 by 6 in.

Dealer's Truck Tour Is Big Success in Colorado

DENVER, COL., Oct. 10—Farmers, dairymen, stockmen, merchants, manufacturers, public officials and truck dealers in northern Colorado were given a practical "short course" in the efficiency of motor transportation in the last three days by a caravan of thirty-six trucks and eight trailers on a "Ship by Truck" tour from Denver to Lafayette, Boulder, Longmont, Berthoud, Loveland, Ft. Collins, Windsor, Greeley, Platteville, Ft. Lupton, Brighton and return. The educational enterprise was carried out under the auspices of the Denver and Rocky Mountain Auto Trades associations and was aided by a special proclamation issued by Gov. Oliver H. Shoup calling upon all citizens to cooperate toward the success of the event.

Bring Truck Show to Public

It was a case of bringing a truck show to the public instead of asking the public to come to the show. There were parades, speeches and other "Truck Day" features to arouse interest and local dealers drove trucks out a few miles from their towns to join the caravan, lengthening it to nearly a mile by the time it reached some of the towns.

The trip was in charge of Capt. H. H. Hall, who handled troop transports in France and a set schedule of driving time was maintained throughout the trip. The main tour with side trips for special demonstrations, covered nearly 200 mi., and as many as 500 farmers were in the crowds welcoming the "show" at some of the larger towns visited.

The speaking program included M. L. Poteet, director of the Firestone ship-by-truck bureau, and Dwight H. Elder, manager of the Troy Trailer Sales Company in Denver.

Trucks Fully Loaded

The trucks, which ranged from $\frac{3}{4}$ -ton to 5-ton units, were loaded with merchandise, farm produce, machinery, road culverts, coal and a wide variety of materials produced or used extensively in the rich region covered by the tour.

Besides arranging plans to have crowds on hand when the trucks were due to reach their towns, committees all along the line were asked to gather specific information regarding actual cases showing substantial savings in expense or superior service provided by truck shipping done in their communities.

Give Local Saving Examples

This systematic plan of inquiry, which was followed up diligently by the general committee in charge of the tour, brought out specific instances of exceptional value for "selling talk" because of the marked degree of service improvement or cost saving accomplished by truck shipments.

For example, a farmer living near Loveland was able to ship a 1250-pound hog to the National Western Stock Show at the Denver Union Stockyards at a round-trip cost of \$8.50, while shipping by railroad express would have involved an expense of \$68. A saving of about \$40 on a shipment of household

goods for a still shorter distance was reported by a Greeley citizen.

From some of the towns, trucks were sent out into the country for loads of sugar beets and other products, to bring the truck haulage lesson "as close to home" as possible.

Every dealer represented in the tour is more than satisfied with the results already shown and expected to develop. Similar tours will be organized in other sections of the state in a short time. Virtually all the trucks returning last night from this first tour are booked to leave Denver tomorrow morning for Colorado Springs, as a special feature of the annual convention of the Rocky Mountain trades body, which has the promise of delegates from eight states. On this trip, the trucks will go through Littleton, Sedalia, Castle Rock and Palmer Lake.

McMILLAN OF PACKARD, IS DEAD

Detroit, Oct. 6—Philip Hamilton McMillan, secretary and treasurer of the Packard Motor Car Co., died suddenly Oct. 4. Heart trouble was the cause of his death. He had been in poor health for several months, but was able to attend to his business affairs until a few hours before his death. Besides his association with the Packard company he was one of the publishers of the Detroit Free Press and a director of the First & Old Detroit National Bank, the Detroit Savings Bank, Detroit Seamless Steel Tubes Co., the Standard Accident Insurance Co., Michigan Fire and Marine Insurance Co., Cass Farm Land Co., and the Blackstone Land Co. He was 47 years old.

NEW ORLEANS TO REPEAT SHOW

The motor car show which was so successful in New Orleans in March, will be repeated in March, 1920. The idea of the show has been copyrighted by the designer, Clarence Bennett, and the local privileges have been given to the New Orleans Lodge of Elks, No. 30.

ARMY CARS SOLD TO ENGLISH

Paris, Oct. 3 (Special Cable)—An English syndicate has purchased all of the 16,000 reserve motor vehicles from the American Third Army at Coblenz. Passenger cars and trucks are included in the lot. The majority of these will probably be sold in the English market.

OREGON FACES "GAS" FAMINE

Portland, Ore., Oct. 10—This city and state are suffering from a gasoline shortage which in some places has become an actual famine, with motorists unable to procure gasoline for days at a time. The shortage is due to a state law which harks back to pre-war days of high grade gasoline.

Under this law, gasoline sold in the state must pass a 56 specific gravity test. There is "no such animal" nowadays



View of Colorado Springs by truck tour.
(Inset) Harrison Goldsmith, manager Rocky Mountain Auto Trade Association, and Dwight H. Elder, manager Troy Trailer Sales Co., Denver, Colo.

without putting the gasoline of ordinary commerce through an additional refining process. As Oregon is alone among Pacific Coast states in such a requirement, other states basing gasoline tests on boiling points, it is first to feel general shortage.

Actual famine conditions in Portland have been averted through action of Gov. Olcott in declaring the 56 specific gravity law will be temporarily abrogated, so as to permit oil companies to bring in 16,000 barrels of gasoline from Seattle to tide over the shortage.

The oil companies reply that rigid enforcement is certain to cost Oregon motorists at least one cent more per gallon than other Pacific Coast states pay, and at the same time will leave the state subject to shortage at any time.

NO SPOTLIGHTS IN CANADA

Use of spotlights on motor cars is now forbidden in Canada. A copy of the new Motor Vehicle Act of Ontario provides "it shall be unlawful to carry on any motor vehicle operated on a highway any light which revolves upon a pivot or other device so that rays of such light may be projected in different directions."

The motor clubs of Buffalo and other border cities are calling the provision of the new law to the attention of motorists who plan tours into the Dominion.

OHIO NEEDS SOME GARAGES

Columbus, Ohio, Oct. 12—Ohio is confronted with a new housing problem, not for officials but for state-owned motor cars and trucks. The Ohio Highway department recently received more than 300 trucks and cars for use in highway maintenance. Altogether, more than 800 automobiles and trucks have been awarded to Ohio in the demobilization of the government transport system. State Highway Commissioner A. R. Taylor is making arrangements to distribute these motor vehicles among the various counties. But the first concern is the housing of the vehicles. They are at present allowed to stand in the open at the state fair grounds and at the Federal storage plant, east of Columbus.

GENERAL MOTORS BUYS FISHER STOCK

Detroit, Oct. 14—A proposal of the General Motors Co. for the purchase of 300,000 shares of common stock, representing an increase of the present capitalization of the Fisher Body Corp. to \$500,000, is being considered favorably by the directors of the latter corporation, according to Pres. F. J. Fisher. The plan contemplates a voting trust which will insure continuation of control of the Fisher Body Corp. by the present management. The transaction is expected to provide the capital necessary for plant additions to meet the demand for Fisher products. Action is expected at a meeting of the directors of the Fisher corporation in the next few weeks authorizing the conclusion of negotiations.

Flying Parson Shows the Way Across the Continent

LIEUT. BELVIN W. MAYNARD captured first honors in the coast-to-coast airplane race by flying from New York to San Francisco in 24 hrs. 58 min. 55.5 sec. actual flying time. Second and third places are credited to Major Carl Spatz, and Lieut. C. Kiel, who flew from San Francisco to New York.

Most of the contestants flew from the Atlantic to the Pacific, only about one-

pass. Twenty-two dealers are represented with trucks, one dealer with two and a Goodyear Service truck and a Navy recruiting truck make up the train.

The tour will cover 450 mi. with night stops at Marshalltown, Oskaloosa, Osceola, Winterset and Perry. The noon patrols will be at Nevada, Grinnell, Chariton, Creston, Guthrie Center and Boone.

ratings based on shortest flying time, shortest elapsed time and a special handicap depending on the size and power of the plane. Most of the entries are D H 4's with Liberty engines although a number of other types are entered as well as one or two captured German Fokkers.

Known as "Flying Parson"

The winner of the first trans-continental air race, popularly known as the Flying Parson, also won the elapsed time feature of the recent Toronto to New York air race. He received his aerial spurs in France in one of the most dangerous jobs in France, that of airplane tester. When the United States declared war on Germany, Maynard was attending a theological school and expects to go back in the ministry as soon as he is mustered out of the army.

For several months he held the world's record for consecutive loops. At Romorantin, France, he looped the loop 318 times at an altitude of 2000 ft. much nearer the ground than any aviator had attempted before.

FIELD FOR TRACTORS IN EUROPE

Washington, Oct. 7—The prospects of farm tractor sales in Europe are increasing with the return of European farmers to pre-war conditions. The Department of Agriculture has received information that crop prospects in eastern Europe are considerably better than the previous official reports indicate. Bulgaria and Hungary are now on practically a pre-war basis. Roumania is still suffering and will require time to resume normal operations. The population which evacuated eastern Poland and western Russia during the war, is returning and again beginning to cultivate wheat.

WILL DISCONTINUE SIMPLEX CAR

New York, Oct. 4—Manufacture of the Simplex motor car is to be discontinued by the Wright-Martin Corp., according to a recent announcement. The instability of the market for high-priced cars is given as the reason. It was decided the manufacture of motor trucks would be more profitable to the stockholders.

The aeronautical corporation will continue to operate the Simplex service station on Long Island. There are 600 Simplex cars now in use, and about one car a day is received at the service station for overhauling.



Lieut. B. W. Maynard, the "Flying Parson"

fifth of the entries making the eastward trip. The army has arranged for special

25 TRUCKS IN IOWA TOUR

Des Moines, Iowa, Oct. 12—Twenty-five trucks have been entered in the first annual Des Moines Truck Development tour which leaves Des Moines Oct. 13 for a six-day tour in the Des Moines trade territory. Harter B. Hull, and Don Chamberlain, president and secretary, of the Des Moines Motor Truck Dealers' association, under whose direction the tour is being run after making the pathfinding trip this week report that there is a decided interest in the coming tour in the towns through which it is to

The Readers' Clearing House

Questions and Answers

Carburetion

Conducted by Roy E. Berg
Motor Age Editorial Staff

Setting for Cadillac Carburetor

Q—1—Give correct setting of Cadillac carburetor, Model 51, 1919. 2—A Buick Light Six, Model 55, equipped with Marvel carburetor will not operate on slow speed unless primer is open half way. I cannot get the needle valve below $2\frac{1}{2}$ turns. It will run on high speed but kicks back into the carburetor and burns up unnecessary gasoline. Have had the float shellaced and carburetor cleaned, also manifold inspected for leaks, but without results.—A Mackie, Mac's Garage, Port Arthur, Ont.

Consult Fig. 1, which shows the outside of the carburetor. Open the throttle about 2 in. on the sector at the steering wheel and place the spark lever in the "driving range" on the sector and then start the engine, running the engine until the water jacket on the intake pipe is hot. Move the spark lever to the extreme left on the sector and the throttle lever to a position which leaves the throttle in the carburetor slightly open. Adjust the air-valve screw A to a point which produces the highest engine speed. Turning the screw A in a clockwise direction increases the proportion of gasoline in the mixture and vice versa. Close the throttle by moving it to the extreme left on the sector and adjust the throttle stop screw B to a point which causes the engine to run at a speed of about 300 r.p.m. The spark lever should be at the extreme left on the sector when this adjustment is made. With the spark and throttle levers at the extreme left on the sector adjust the air valve screw, A, to a point which produces the highest engine speed. Open the throttle until the shutter attached to the right-hand end of the throttle shaft just covers the slot in the carburetor body. Then adjust the screw G to a point which produces the highest engine speed, or to a point where the engine slows down slightly from a lean mixture. Turning the screw G in a clockwise direction increases the proportion of gasoline to air in the mixture and vice versa.

During extremely cold weather when richer mixture is desirable it may be found best to turn the adjusting screw G further in a clockwise direction.

2—Your troubles may not be in the carburetor but can be in valves or ignition. In so-called carburetor troubles, more than half the cases can be traced to other things, but because it is possible to adjust the carburetor this is taken to be the source of trouble.

Our suggestion is to go over both valves and ignition, taking up any lost motion in connections, cleaning everything and getting these parts in good shape. It will then be possible to adjust the carburetor.

THIS department is conducted to assist dealers, service stations, garagemen and their mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Motor Age reserves the right to answer the query by personal letter or through these columns.

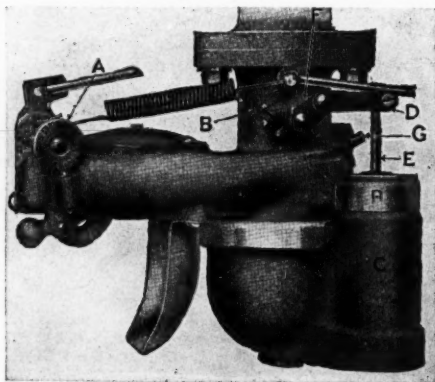


Fig. 1—Carburetor on Cadillac, Model 51, 1919

See Fig. 3 for details of the Marvel carburetor. Turn the gasoline needle valve to the right as far as it will go. Set the air adjustment so the end of the adjusting screw is even with the point of the ratchet spring above it. Open the gasoline needle valve one full turn to the left. Now start the engine and let it run until the water in the radiator is good and warm. Retard the spark and then turn the gasoline valve to the right, until the engine idles.

Now advance the spark and slowly turn the air adjusting screw to the left until the engine begins to slow down. Then turn to the right until the engine runs well. Advance the spark and open the throttle suddenly. If it misses or fires back, turn the gasoline needle valve a little to the left, leaving the air adjustment where it is. If you cannot get results this way probably the float level is too low for good results.

Fitting Improved Manifold

Q—Give suggestion for making a new manifold cast with water jacket or hot spot for 1913 Cadillac so as to do away with long intake pipe from carburetor to manifold.

2—What company does this kind of work?

3—Would aluminite pistons used with

old connecting rods give any more power? —V. S. Jackson, Holliday's Cave, W. Va.

1—A design for a manifold to assist in the carbureting of the heavy fuel is shown in Fig. 2. The curved section is the hottest place in the carburetor and might be termed a hot-spot. The curvature is given to this section because the heavier portions of the fuel will be thrown against this surface and from there will be deflected downward, and at the edge of this surface will meet the air. The hot gases can be brought into the manifold from the top, led there by a flexible tube connected to the exhaust manifold. A spoon arrangement should be fitted to the end of this flexible tube so that the hot gases will be deflected into the tubing to the hot section in the intake manifold. The gases after passing through the intake manifold can be led outward from the side of the heated section as is indicated in the circular opening just above the hot-spot.

2—After making a detailed sketch of your manifold you should have blue prints made from it. These can be sent to any number of manufacturers whose names can be found in the advertising columns of Motor Age.

3—Aluminum alloy pistons will increase the power of your engine slightly. This, however, is not the biggest advantage obtained from light pistons. In a four-cylinder engine the vibratory forces are reduced considerably when light reciprocating parts are used. This allows the engine to run at a higher speed with less vibration.

Improving Carburetion on Overland

Q—What would you suggest to improve the carburetion on an Overland 83 B?—J. Barnhart, Toledo, O.

To give simple directions for making any sort of improvement is difficult inasmuch as we have not been told of the existing condition or conditions. It would mean a pretty thorough overhaul of the whole power plant, including the fit of pistons and rings, ignition apparatus and all connections and the carburetor and its connections.

Even the cooling system has a most important bearing on the matter of carburetion, for an engine which becomes too hot or not hot enough will not permit of perfect carburetor adjustment. But if the general instructions set forth are followed there is every reason to believe a far better running engine may be developed.

Start in by cleaning the radiator, which in turn will result in the entire cooling system being clean. This should be accomplished by making a mixture of common washing soda and putting this into

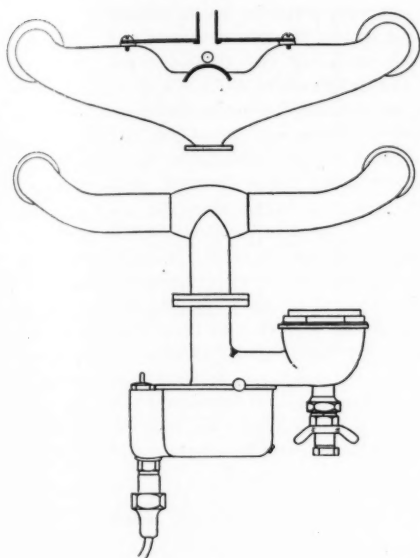


Fig. 2—Special manifold design for 1913 Cadillac

the radiator. The soda should be dissolved in warm water—about 2 lb. to 2 gal. Strain it before putting in the radiator, after all the water has been drained. Then add enough clear water to fill the system. Do not permit any of the solution to touch clothes or paint, as it will ruin them.

Keep this mixture in for 24 or even 48 hours, while using the car, and then drain. Flush with clear water and the next day flush again.

Burn the carbon out of the cylinders and do not forget to run kerosene into the engine by pouring a pint, gradually, through the air intake of the carburetor. This will tend to loosen the rings if they are sticking.

Grind the valves and properly adjust the tappets so there is correct clearance. Be sure to see that all gaskets are tight and that every nut is firmly set down.

Go over the intake manifold gaskets and see that there is no air leak at any of the joints. This can be accomplished by running the engine and squirting from an oil can a little gasoline or kerosene. If it is sucked in you may know there is an air leak, and it will be impossible to adjust the carburetor under such circumstances. An inspection of the valve stem guides should be made to be sure that they are not so badly worn as to permit excess of air entering here.

The fuel tank and fuel line should be cleaned out to ascertain nothing may stop the flow of gasoline. The carburetor should be cleaned and it should be known that the float is not punctured.

Now take up the ignition system. The battery should be gone over, filled with water, fully charged; every connection should be known to be clean and all terminals bright. The breaker points on the timer and the distributor brush should be clean and without wear which might tend to cause a loss of positive action. The ignition timing should be checked up to know that this is correct, according to the maker's instructions.

TO assist readers in obtaining as a unit all information on a certain subject **MOTOR AGE** segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

CARBURETION

A. Mackie.....Port Arthur, Ont.
V. S. Jackson.....Holliday's Cave, W. Va.
J. Barnhart.....Toledo, Ohio

LUBRICATION

John Dupins.....Chicago.
W. L. Ziegenbein.....Houghton, Mich.

ENGINES—GENERAL

John McDowell.....Cedar Rapids, Iowa.
Jery Marks.....Detroit.
John H. Banc.....Burlington, W. Va.
A. G. Bentley.....Dayton, Ohio
J. A. Heyser.....Los Angeles, Cal.
George Opel.....Coldspring, Ky.
W. Westerman.....Douglas, Wash.
C. B. Roy.....Lafayette, La.

THE ELECTRIC SYSTEM

J. C. White.....San Antonio, Tex.
Baker & Ratliff.....Butte, Mont.
Paul Fellwork.....Vincennes, Ind.
R. J. Stillman.....Waterloo, Iowa.
B. H. Dow.....Seattle, Wash.
George Opel.....Coldspring, Ky.

FRONT AXLE REPAIRS

G. J. Wislon.....Milwaukee, Wis.
W. E. Lang.....Champaign, Ill.

REBUILDING

E. E. Lovejoy.....West Gouldsboro, Me.
G. E. Arnold.....Jiggs, Nev.
John Poster.....Cleveland, Ohio
R. Midgley.....Mento Park, Cal.
C. F. Culpepper.....Birmingham, Ala.

Wires leading to the spark plugs should be known to be in good condition, so there is no loss of current and the plugs should be cleaned and the points set not more than 1/32 in. apart.

It is now time to go to the adjustment itself. The engine should be run until it is thoroughly warmed. The spark lever on the steering post should be retarded until it is about a third of the

way up on the quadrant; while the throttle should be set so the engine will be turning over at what would be about 15 m.p.h. car speed when running on the road in high gear. The adjusting valve under the carburetor should be turned to the right until the engine begins to miss fire and then turned to the left until the engine runs without missing. Now open the throttle quickly, all the way, and if there is missing it will be necessary to turn the needle valve a trifle farther to the left.

If the engine seems to lack power on the road or in climbing a hill, or there is any backfiring, it will be necessary to turn the needle valve a little more to the left; if the engine misses when idling or there is a tendency to "load" it will be necessary to cut down the fuel supply by turning the needle valve to the right. While driving the car on the road you will have opportunity to see how the engine responds and it may and probably will be necessary to make slight adjustments until the best results have been obtained.

Lubrication

Oiling System of 1914 Cadillac

Q—Publish diagram of oiling system of a 1914 Cadillac. Must oil be put in both places on right and left side of engine?—John Dupins, Chicago.

A diagram of this oiling system is shown in Fig. 4. As shown, the crankcase is divided by walls A into four compartments. In the bottom of each compartment there is a depression or well, B. The crankcase should always contain sufficient oil so that each of these four wells will be from three-fourths to entirely full and so that the splashers, C, which are attached to the connecting rods, will dip into the supply and throw the oil over the parts to be lubricated.

On the left side of the engine there is a lubricator tank or reservoir which receives the fresh oil. In this lubricator there is a double-acting force pump. One movement of the pump plunger forces the oil through the feed pipe up to the sight feed on the dash. The oil drops to the bottom of this sight feed and from there is drawn by the other movement of the

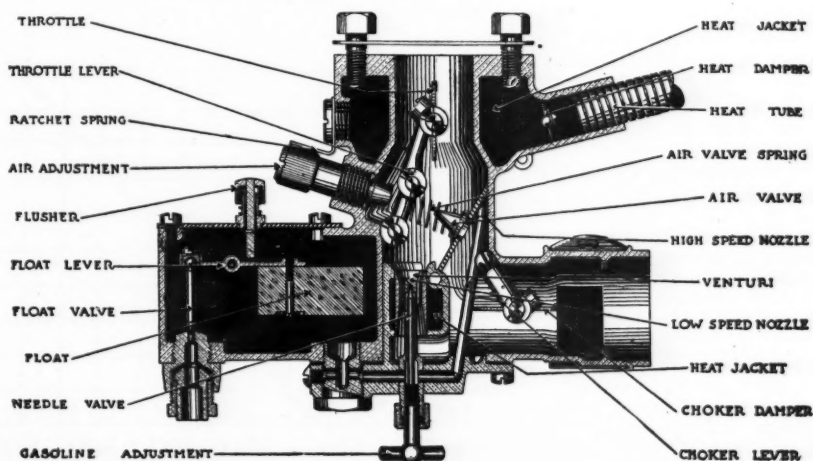


Fig. 3—Details of Marvel carburetor

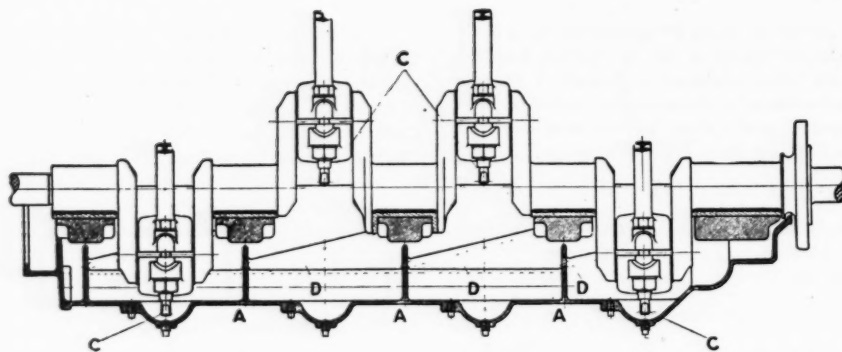


Fig. 4—Oiling arrangement of 1914 Cadillac

pump plunger and forced to the third compartment of the crankcase to maintain the supply there.

As before stated, the splashers at the lower end of the connecting rods throw the oil all over the inside of the engine and that which is now used in lubricating drains down the inside walls and into the sloping troughs D, at the side. These troughs carry the oil from one compartment to the other so that the supply is maintained uniformly in each.

The adjustment for the oil supplied to the crankcase should be so regulated that the quantity in the wells will be maintained as before mentioned. The supply is governed by the length of the stroke of the plunger of the lubricator pump. The longer the stroke of the pump plunger, the more oil is forced through the feed pipe.

On top of the lubricator, on the plunger, there are two notched collars. The upper one is the adjusting collar attached rigidly to the plunger. The lower one is the locking collar. To adjust the stroke of the plunger, first loosen the locking collar. Then to increase the supply of oil, turn the adjusting collar to the right, screw it down. Doing this gives a longer stroke to the plunger. After making an adjustment, be sure to lock it with the locking collar.

To supply oil to the crankcase it is necessary to remove the cap which covers the filler hole. There is but the one.

Oiling of Emerson

Q—How is the clutch on an Emerson car oiled?—Ralph W. L. Ziegenbeing, Houghton, Mich.

The oil in the crankcase takes care of the clutch also, in much the same manner as in the Ford engine.

Engines

Replacing Valve Springs

Q 1—What effect, beneficial or otherwise, is it to the cylinder in particular or engine in general, if a six-cylinder overhead valve engine, 1919 model, be equipped with six of the original valve springs and six eight-cylinder valve springs, same make and model, all cylinder springs being applied to the exhaust or as used in an eight-cylinder engine of the intake valves. The eight-cylinder springs have a greater diameter and would rub against the six spring on same cylinder.

2—Is there such a thing as a baffle plate to prevent excess cylinder oiling?—John McDowell, Cedar Rapids, Iowa.

1—Every engineer has worked out what is necessary in the matter of size and strength of the valve springs used in his engine. He may, of course, make a mistake, but common practice is now too well defined to be far away from what is right. It is safe to assert, therefore, that the valve springs on any engine are correct in all ways. Occasionally a spring will weaken and it then calls for replacement. To put on heavier springs calls for greater work for the camshaft and all its connecting parts. It might be a little surer in seating the valve but that is all. The springs intended for that particular engine, however, will do this. If you find you need springs a little stiffer it would be better to have a set made, to conform to the general size of the springs now in use but of a trifle heavier gauge stock. They should not be permitted to rub anything, else they will bind and will not be free enough to close the valves as they are intended.

2—Yes, baffle plates have been used extensively in the past and are sometimes now used on old cars. But they are unnecessary, for better means have been found for stopping the oil from reaching the combustion chambers. A baffle plate

is merely a piece of reasonably heavy sheet brass, bronze or sheet iron between the bottom of the cylinder and the top of the crankcase, with a slot in the center to permit the connecting rod to move freely. Thus oil splashed upward will strike the plate and be precipitated. In case a baffle plate is used, extreme caution must be taken that the metal is not too thick, as this will raise the cylinder block and decrease the compression by increasing the combustion chamber. Where oil slips past the piston and rings it is better practice to have the cylinders reground and new pistons and rings fitted. On a splash system it is possible to cut down the oil level and thus prevent over lubrication, but as you do not state the make of engine it is impossible to advise in this regard.

Locomotive Power Curve

Q—Publish power curve of 1919 Locomobile.—Jerry Marks, Detroit.

This is shown in Fig. 5.

Back firing in Hupp

Q—A 1917 Model N Hupmobile will run well as long as a moderate speed is not exceeded on the level or until some distance is made on a grade. It will not take much throttle opening for any length of time, but will suddenly seem to lose power and commence to back fire through the carburetor apparently from one cylinder, shortly followed by back firing from other cylinders. If the car is stopped for a few minutes it will run alright. This happens when the Moto Meter registers a warm or hot engine. The gasoline line is clear, Zenith carburetor is clean and jets are entirely open. Carbon has been thoroughly cleaned from engine, ignition system has been overhauled by factory, valves have been ground and all work freely in guides, distance between tappets and stem have been adjusted to .005 or .006 in.—John H. Bane, Burlington, West Va.

Three things seem to suggest themselves in this case, lack of sufficient fuel,

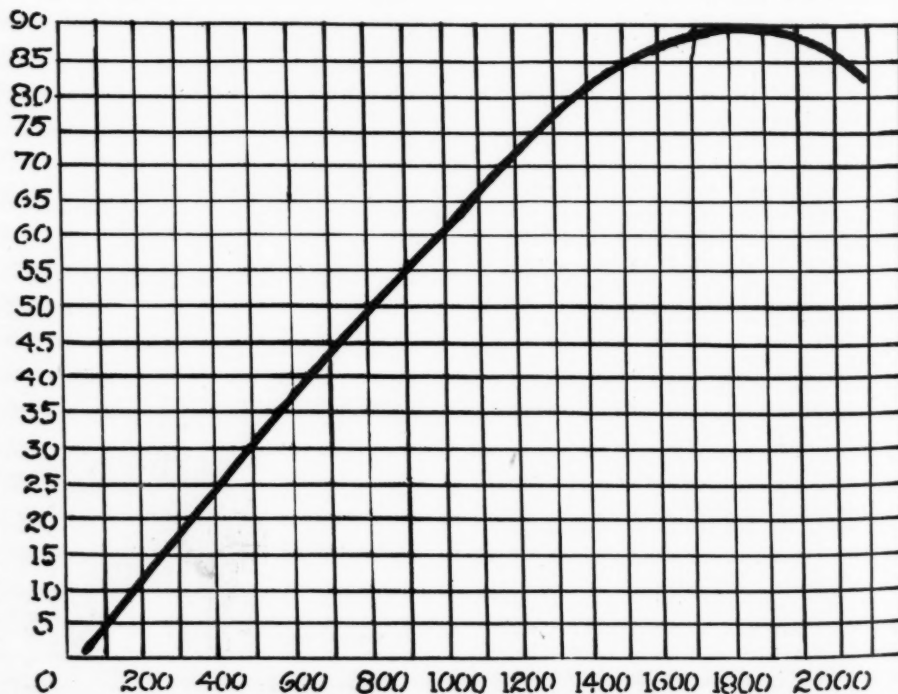


Fig. 5—Power curve of 1919 Locomobile



Fig. 6—Power curve of the 1919 Singer, showing peak of horsepower at 1900 r.p.m.

a weak battery or coil that is out of kilter. Naturally a car will run on a light charge of fuel at moderate speed, but when the throttle is opened still further the mixture is exhausted and the result will be a backfire.

A comparatively weak spark will be sufficient to run the engine under light load, but not on a pull, when a heavier charge of gas is taken into the cylinder. This has been shown many times. There is the further possibility of the ignition not being correctly set for best results. Retard the spark lever and see if the spark occurs at top dead center on the compression stroke, as it should. Do not disturb anything in the ignition apparatus, but look it over for loose connections, a stray wire and possibly causing a slight short and then see that every part is clean, particularly the distributor, which may be in a condition to prevent the full spark reaching the plug. This is by no means unusual and yet the carburetor is charged with all the ills which come to an engine.

Knock in Overland

Q—How can the knock in an Overland 83 be remedied. The carbon has been removed and bearings are tight.

2—Can this be remedied by raising cylinders $\frac{1}{8}$ or $\frac{1}{4}$ in. to increase combustion space?—A. G. Bentley, Dayton, Ohio.

1—There are so many things other than carbon and loose bearings to cause a knock that it is difficult to say what is the reason inasmuch as you give little information upon which to base an opinion. Begin by testing the ignition setting. With the spark lever fully retarded the spark should occur at the top center on the firing stroke. A knock will occur particularly on a pull or on going up a grade if the mixture is too lean but we believe that you will find a loose engine bolt or possibly a loose cylinder block.

The writer had just this experience and worked for hours to locate the trouble. When driving at a moderate speed there was no knock, but on a pull or when climbing a grade or when driving above 20 m. p. h. the knock was most pronounced. Tightening one engine bolt remedied the whole trouble and also eliminated vibration which had been noticeable.

2—We do not think this is necessary; few engines today have too much compression. Unless this trouble has always been with the engine it is certain this is not the difficulty.

Tip on Carbon Deposit

Q—In one of your late numbers I noticed someone living in Indiana had to scrape carbon on a late model Chevrolet every 250 miles. I wish to add that I experience the same difficulty on my Olympian and found that it was caused by rapid wear in the tappets and rocker arms. The metal was too soft in the push rod tips. After replacing these parts the car could go anywhere with more power.—Alfred Zehetner.

The effect of soft material on the tappets and rocker arms would be to cause so much wear that the valves could not open as far as designed, thus preventing a full charge of gas to enter the cylinders and preventing proper scavenging, which naturally would permit carbon to deposit itself in the combustion chamber. The tip, however, may be of service to others.

Starting Engine in Cold

Q—What would cause piston seizure or scoring of cylinders and other mechanical failures when a perfect engine is started on a cold day and immediately turned into a mountain pass averaging a steady 4 per cent grade for 10 miles and run nearly wide open and even twice the oil furnished the engine as factory stock jobs? The MotoMeter never goes to normal. The engine has been run 8,000 mi. but

never under the same condition of starting cold and pushed over a grade so fast. This kind of failure occurs on road and speedway. It seems as if many engines develop trouble early in races by not being thoroughly heated up before starting and everyone knows how fine a car runs after it has been driven 100 miles or so steadily. The engine referred to has gone over the same grade several times before just as fast but has had to run 45 miles to get there. What is the mechanical or chemical reason for the failure?

2—What number of degrees on the flywheel would one tooth advance of the cam gear make on a Ford? Give this for the old spur gear and the new helical gear.

3—Would the engine run well enough at slow speed with the helical cam gear advanced one tooth?—J. A. Heyser, Los Angeles, Cal.

1—While you seem to have answered your own questions, there are so many things to take into consideration that a long-distance view of the case may change things. There appears to have been some temporary stoppage of the lubrication, and it is quite likely that this may have been caused by starting the drive at excessive speed when the engine was cold, so that the oil had no opportunity to work. At the same time it is possible that the grade permitted the oil to drop back and starve one of the cylinders and this seems likely the case. Yes, you are correct in asserting that it is a mistake to start even on a moderate drive without the engine being warmed up to some extent and in the case of thermo-syphon cooling this is all the more a true. Water will not flow in a thermo-syphon unless the system is full and while the temperature of the water is being raised sufficiently to permit it to flow damage could be done to the engine in just the way suggested.

2—There are twenty-one teeth on the crankshaft gear and forty-two on the camshaft gear, so that moving the latter a tooth would be about 7 1-7 degrees on the flywheel.

3—We would not advise changing the valve timing, as this has been carefully figured out by the designers of the engine and they have tried for best results. In addition you would have to reset the ignition timing, for this would not be in keeping with the travel of the pistons if the valve timing were changed.

Singer Power Curve

Q—Publish power curve of 1919 Singer.
—Jerry Marks, Detroit.

See Fig. 6.

New Bearing in Hupmobile

Q—How can the front bearing on crankshaft of a Hupp 20 be taken up?

2—What firm built the Ohio car and what engine did they use?—George Opel, Coldspring, Ky.

1—It will be necessary to put in an entire new bearing, as this is, as a matter of fact, a bronze bushing. The flywheel will have to be removed and the front plate of the crankcase taken off. It may be necessary to pull the crankshaft back, after uncoupling the drive shaft. When the crankcase front plate has been removed the bearing bushing will come with it. A new one will be necessary and this needs to be pressed onto the plate and then reamed out to fit the

crankshaft, allowing about .004 in. clearance. It would be well to remove the crankshaft entirely and true up that portion coming in contact with the bearing bushing, otherwise you will not have a true bearing surface.

2—The Ohio motor car was made by the Crescent Motor Co., Cincinnati, Ohio.

The engine used was made by that concern. Parts for this car can be secured from the Puritan Machine Works, Detroit and the Northway Auto Parts and Sales Co., Cincinnati, O.

Changing Cam on E. M. F.

Q—I wish to put a high-speed cam on my E. M. F. speedster. Could the E. M. F. cam have the heel ground off? It is a 1911 engine.—Will Westerman, Douglas, Wash.

This will not prove successful, for it is plain that by grinding off any of the cam you will change the time of opening and not only change the time of closing and opening but will reduce the length of time the valve is held open and will, consequently, alter the entire scheme of taking in and expelling the gases. For racing purposes special cams should be designed.

Flooding an Engine

Q—Is it possible to flood an engine when cold by holding the choker out for too long a period when starting the engine?

2—Which is considered the best balanced engine, the four, six or eight-cylinder engine, and why? While is next to the best?—C. B. Roy, Lafayette, La.

1—You cannot actually flood an engine, but by holding the choke shut practically raw gasoline will enter the combustion chamber. We say practically because some of it will be burned, but it will be a slow-burning charge and gradually the fuel will be so heavy that it will not burn and the engine will stop. It dies just as a human being would without sufficient air.

2—The six-cylinder engine is the best

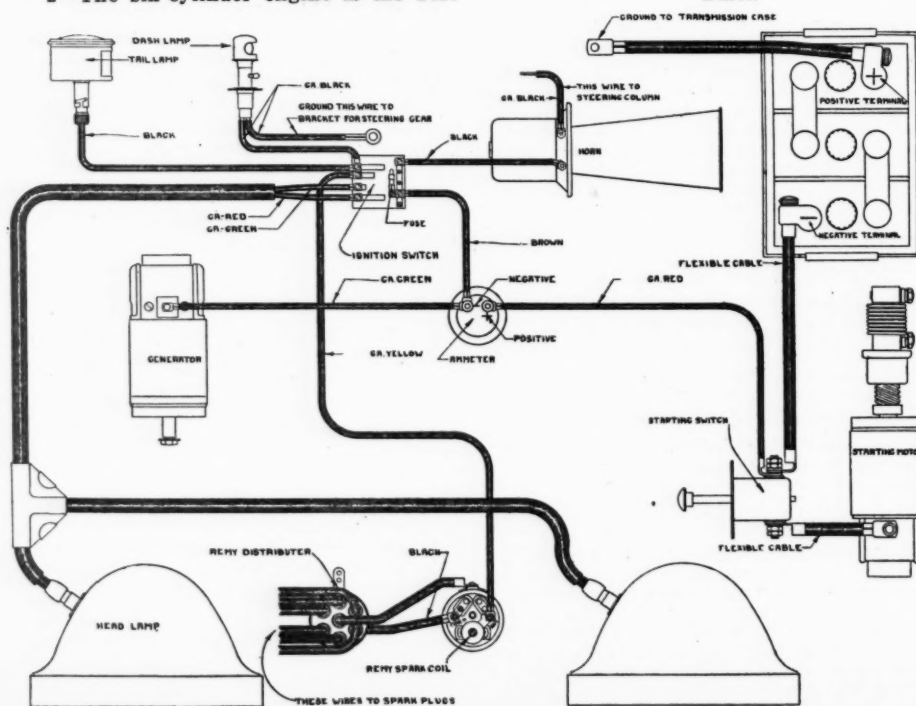


Fig. 7—Wiring diagram of the starting and lighting system used on the Paige 6-39

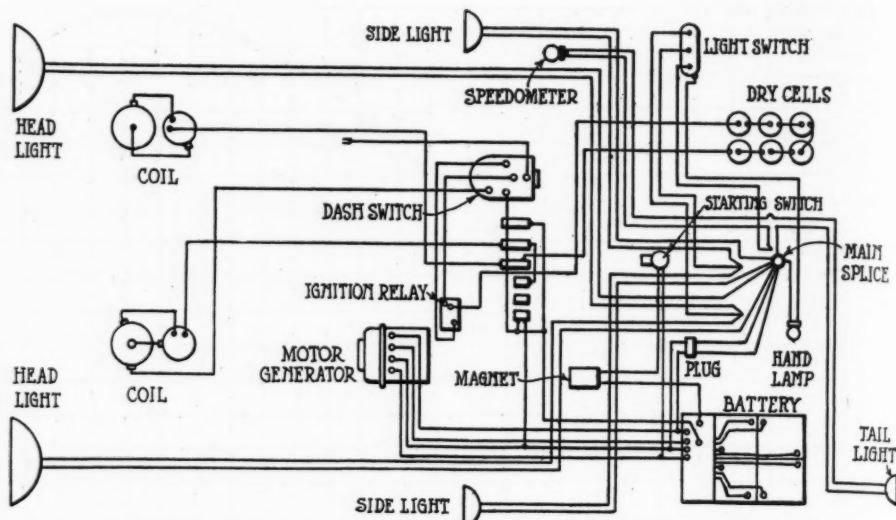


Fig. 8—Wiring diagram of the electric system used on the 1912 Cadillac

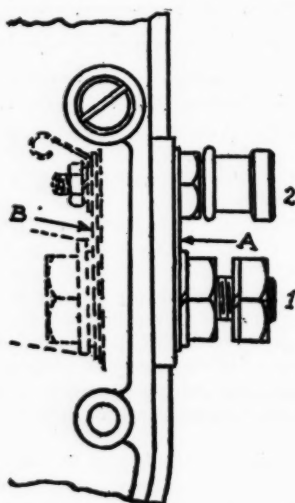


Fig. 9—How to connect ammeter on Buick

balanced job owing to the disposition of the crankthrows at 120 deg. The tendency here is for two cranks to counteract the others, which is impossible in the four-cylinder and partly overcome in the eight-cylinder, where the cylinders are set in a row because here the crank throws are set at 90 deg.

The Electric System

Gray & Davis on Ford

Q—Publish wiring diagram of the Gray & Davis one-unit starter and generator, as used on a Ford car with ammeter connection.—J. C. White, San Antonio, Tex.

The Gray & Davis system for Fords is shown in Fig. 10.

Splitdorf-Apelco Used on Pullman

Q—Publish wiring diagram with ammeter connection on a 1915 Pullman Jr.

2—What starter was used on this car?—Baker & Ratliff, Butte, Mont.

1—The wiring diagram of this car is shown in Fig. 11. The ammeter connections are shown in dotted lines.

2—The Splitdorf-Apelco electric system was used on this car.

Ammeter on 1912 Cadillac

Q—Publish diagram showing how to connect an ammeter on a Delco system used on a 1912 Cadillac, 24-volt battery.

2—Can I use an ammeter of a 6-volt system?—Paul Fellwork, Vincennes, Ind.

1—The diagram of the wiring is shown in Fig. 8.

Owing to the scheme used in the wiring on this model Cadillac it is hardly possible to connect an ammeter in on the circuit which will register both charge and discharge. The battery being of the 24-volt type made up of four 6-volt batteries, it would be necessary to use four ammeters, one for each section of the battery.

2—A 6-volt system ammeter will work for one section of the battery. This meter arrangement is about the only way in which the current discharge and charge can be measured, but it is not a good idea. When the engine is being cranked the discharge is through the four battery sections in series, so that a meter connected on the outside termi-

nals of the battery would have to register about 70 amp. The meters on the inner sections of the batteries need only be of 6 or 8 amp. capacity. From these conflicting requirements it is plain to see that the idea of connecting an ammeter in on the system is not feasible.

May Be Faulty Cut-Out Relay

Q—With Delco system on a Buick 37, the ammeter shows 5 amp. when running at 10 m.p.h., 10 amp. at 20 m.p.h., then goes back to 1 and 2 amp. when going faster than 20 m.p.h. What causes this? The battery and wiring is O. K.—Raymond J. Stillman, Waterloo, Iowa.

Try putting into the system an ammeter known to be in good condition and see if the same conditions are met with. We are inclined to think that the ammeter is at fault. There is also a chance that the fault is somewhere in the generator itself. In this system the generator starts charging at about 7 m.p.h. and reaches its maximum charging rate at from 18 to 25 m.p.h., which is from 16 to 20 amps. At higher speeds the current decreases to 10 to 15 amps.

There is a chance that the cut-out relay is not working properly. The cut-out relay completes the circuit between the generator and battery when the generator is running at a high enough speed to enable it to charge the storage battery. When the relay contacts are pitted or burned they must be smoothed off with a strip of emery cloth. Or, if too badly burned, new ones are necessary. When the points are correctly adjusted, both pairs will make contact at the same instant and clear across the line of contact, so that when the relay is held up to the light, it is possible to see light passing through any portion of the line of contact.

In adjusting a relay make sure that the bushings are in good order and that the connections and coil terminals are free from grounds or breaks, as these would cause some uncertainty in the operation of the relay.

Adjusting relays is rather delicate work and should only be attempted by someone familiar with their construction and operation.

Disconnecting Generator on Paige

Q—Publish sketch of wiring on a Paige 6-39 showing how to disconnect the battery from the generator while driving the car so that battery will not be overcharged.—B. H. Dow, Seattle, Wash.

The wiring diagram of the connections on the Paige 6-39 is shown in Fig. 7. This generator is of the third brush type and to decrease its output it is necessary to move the third brush in a direction counter to the direction of rotation. The small cover over the brushes should be removed and this will expose the holder which secures the brush to the brush frame. A screwdriver is used to loosen the screw which holds the third brush to the frame and the brush can then be rotated. A very little movement will suffice to reduce the charge rate an appreciable amount.

If the battery is to be disconnected, a short piece of copper wire should be connected across the terminals of the generator. Another way to accomplish the same result is to remove the fuse on the generator which protects the field windings.

Changing Bosch Coil

Q—Can a Bosch duplex coil, type M, be used with a Bosch D U 4 Model 2 variable spark magneto so as to start on battery and then switch to magneto? If so give sketch of wiring.—George Opel, Cold-spring, Ky.

Yes, but you will require a duplex breaker and end piece, which can be supplied by the Bosch company. This is attached to the end of the breaker on the magneto and is operated as is the ordinary breaker. There are two binding posts thereon and a circuit is formed with these, the battery, the switch and the ground. You will therefore start on the battery and switch to the magneto, the secondary current being distributed in the ordinary manner.

Front Axle Repairs

Removing King Bolts on Chalmers

Q—Explain with diagram how to take out the front king-bolts on a 1916 Chalmers 35 A.

2—What is a fair gasoline and oil consumption for the engine, touring car?—G. J. Wilson, Milwaukee, Wis.

1—Please refer to Fig. 12 which shows the various parts in the assembly of the Chalmers axle on the 34A car. The spindle C sets between the jaws A of the axle forging and are held in place by the pin F. Above and below the spindle C will be found thrust washers E to take up lost motion. The king pin F is held from dropping out by a tapered pin G that is driven into the hole D in the spindle forging and all that is necessary to remove the king pin is to drive out the tapered pin G, using a blunt punch against the end which appears to be half round, generally on the back of the axle. B is merely a lug into which is screwed a stud to regulate the turning of the wheels. In case there is play between

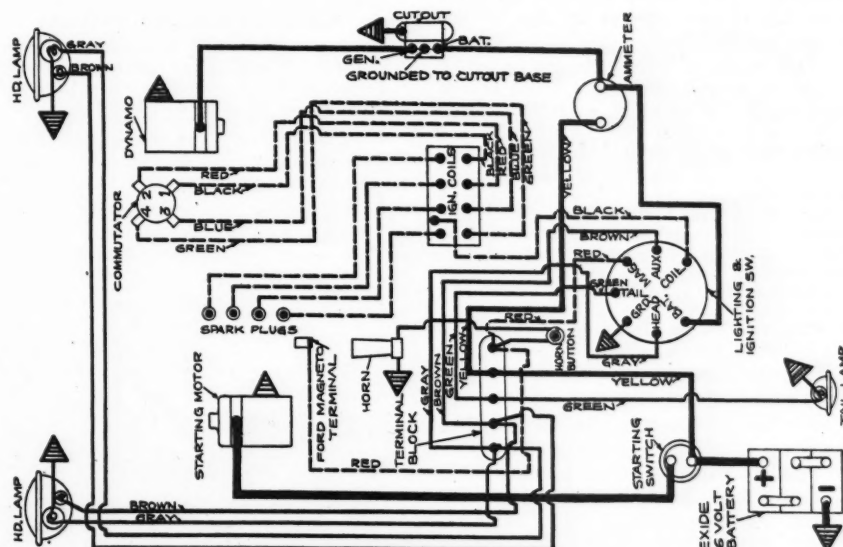


Fig. 10—Wiring diagram of the Gray & Davis system for Fords

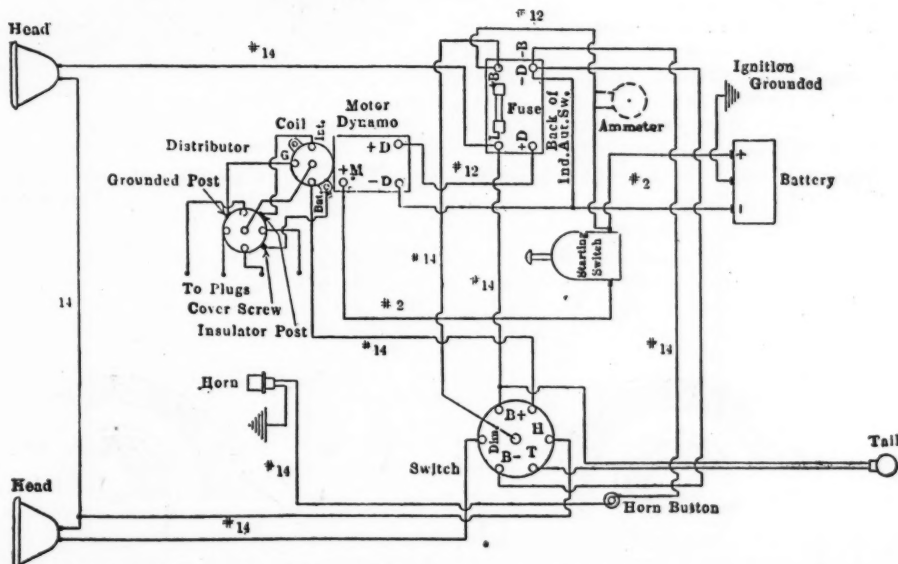


Fig. 11—Wiring diagram of the Pullman using the Splitdorf-Apelco system, used on 1915 models

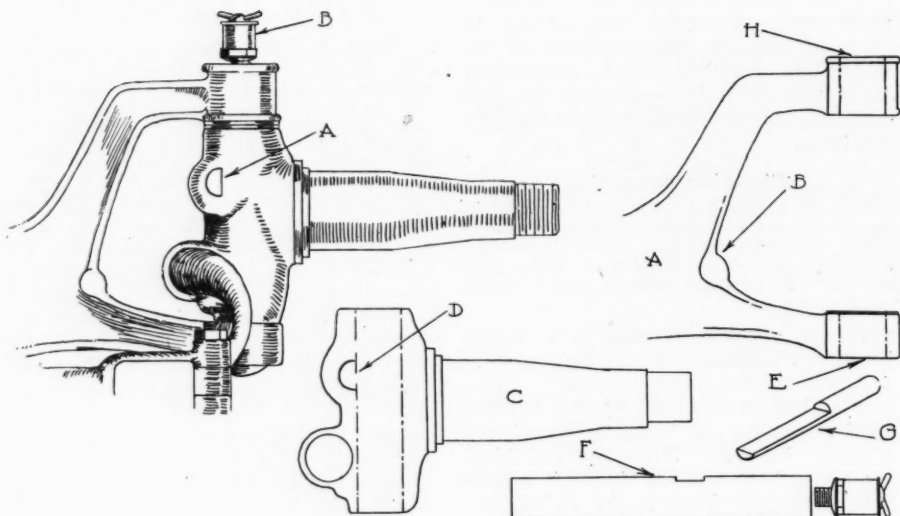


Fig. 12—Layout of king bolt and steering spindle on 1915 Hudson

the spindle and the axle jaws, all that is necessary will be to place a shim on top of the thrust washer at the top of the spindle.

2—You ought to be able to get as many as 15 m. p. g. and perhaps a trifle better if the engine is in good working order.

Construction of Hudson Axle

Q—How are the king bolts and steering spindles removed from the front axle of a 1915-6-40 Hudson? The grease channels leading to the washers which take the upward thrust of the spindles have become stopped up and it is impossible to force grease to these parts. This makes the car steer hard.

2—Explain the construction of this axle.
—W. E. Lang, Champaign, Ill.

1—Consult Fig. 12. If you will clean off the steering spindle and other parts you will find about opposite the spindle, a small taper pin A with a flat side. This is what holds the king pin in place, this being a Timken-type axle all through. Drive out pin A, using a small, dull-end punch against the end which shows the flat side. The king pin can then be dropped after the grease cup B has been taken out.

2—This is best answered by looking at the drawing shown in Fig. 12 and will be readily understood after you have taken its pieces apart.

Front axle construction is pretty well standardized on all cars now and the general scheme of maintenance is, therefore, the same on all.

Rebuilding

Speedster Body On National

Q—Publish design for speedster body for a 1917 4-passenger National roadster.
2—Name some body builders in Boston.
—Edw. E. Lovejoy, West Goulsboro, Maine.

1—A suggestion for converting a four-passenger National car into a speedster is shown in Fig. 15.

2—Following are some body concerns in Boston and its vicinity:

New Haven Carriage Co., New Haven, Conn.

Sargent & Ham Co., Boston, Mass.

Hollander & Morrill, Amesbury, Mass.

Blue Ribbon Body Co., Bridgeport, Conn.

Auto Metal Body Co., Springfield, Mass.

Speedster Body on Cadillac

Q. 1—Publish suggestion for speedster to be made from a 1914 Cadillac, with Daul ignition, Bosch D. U. four high tension magneto and battery Delco system independent of each other, new Miller carburetor and 34 by 4½ Houck wire wheels.

2—What gear ratio should be used for road racing?

3—How can the steering gear be lowered from 2 to 4 in.

4—How are pressure oil and gas pumps installed on a racing car?

5—Do you know of a book which concerns the building of engine and bodies for racing cars?—G. E. Arnold, Jiggs, Nev.

1—This is shown in Fig. 16.

2—It will require some experiment, but not under 3 to 1 and not higher than 2½ to 1.

3—The housing of the steering gear is held in place by a bracket under it and this can be removed, the steering post dropped to the desired position and it will then require a new bracket, which can be made by any good blacksmith.

4—Usually there is one big pump, used for both purposes, with check valves. Two pumps may be used, however, but in this there will be a lot of extra work in



Fig. 13—Side view of Peugeot race car driven by Aitkin in his races with Resta, De Palma and Cooper

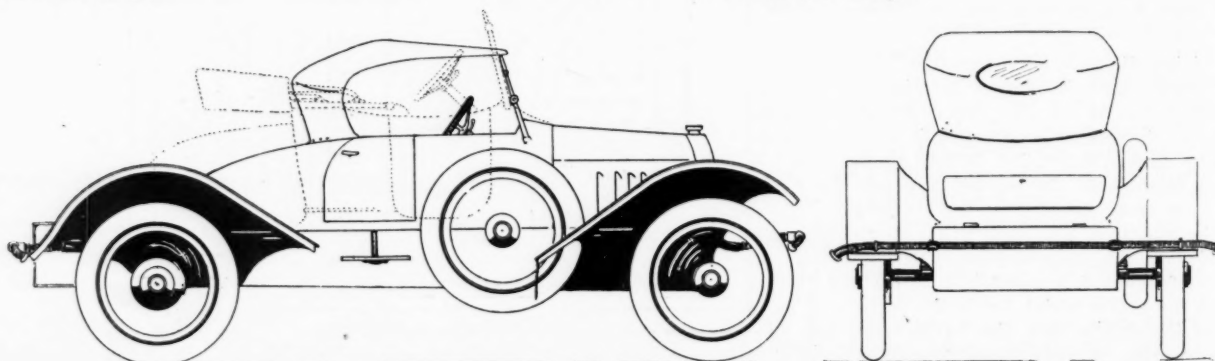


Fig. 14—Side and rear view of speedster body on 490 Chevrolet. The car has windshield, same fenders and large compartment at rear

fitting. The pump can be procured at any good supply house, or see advertising columns of *MOTOR AGE*. There will be a lead of copper pipe at the top of the fuel tank, with a check to prevent the pressure backing up, and another lead to the top of the oil tank; this also with a check. From the bottom of the oil tank a lead can go to the crankcase with a handy and suitable valve to open and close to admit oil to the case. Where a single pump is used for the oil the valve is usually left open and the pressure is depended upon to keep the oil flowing. But there should be a valve so it can be shut when the car is running at only ordinary speeds.

5—No, but *MOTOR AGE* has, for years, given much attention to the equipping of roadsters and racing cars and you can undoubtedly find what you desire by looking in the your back numbers.

Alken's Peugeot Racer

Q—Publish photo of Art. Klein's Peugeot; also Aitken's Peugeot (side view). —John Poster, Cleveland, Ohio.

In Fig. 13 is shown the Peugeot race car driven by Aitken in his race with Resta, De Palma and Cooper. We have no side view of the car driven by Art Klein.

Roadster Body on Chevrolet

Q—Publish sketch of rear and side view of a stream line roadster body mounted on a 1920 Chevrolet 490 chassis with wire wheels, using same fenders, body to have top, plate glass window, wind shield, tank on rear of chassis, spare wheel on side, and bumpers. Compartment in rear large enough to hold a camping equipment.

2—What would such a body cost with two doors?—R. Midgley, Mento Park, Cal.

1—This is shown in Fig. 14.

2—This is hard to say, as so much depends upon the finish and material that goes into the job. Probably \$400 would cover it, although it may run as high as \$500.

Changing Drive on Metz

Q—We have a Metz friction drive car either a 1916 or 1917 model which we desire to change to a gear drive. Would merely a transmission do or should the whole rear end be torn out?—Wm. F. Meyer, Auto Repairing and General Overhauling, Quincy, Ill.

The results will hardly warrant the expense of such a job, for it means practically rebuilding the car from the engine back, requiring a new flywheel with which can be incorporated a clutch, the gearset and the final drive. Such so-called improvements usually are so expensive that it will exceed the market value of the car and will not enhance the selling value to any considerable extent, surely not enough to get the added cost out of it.

Rebuilding for Speed

Q—Expect to rebuild an Overland 75 into a speedster. How is this model geared?

2—What gear ratio would you advise for road use? Would a 3 to 1 gear ratio be high enough to make it speedy?

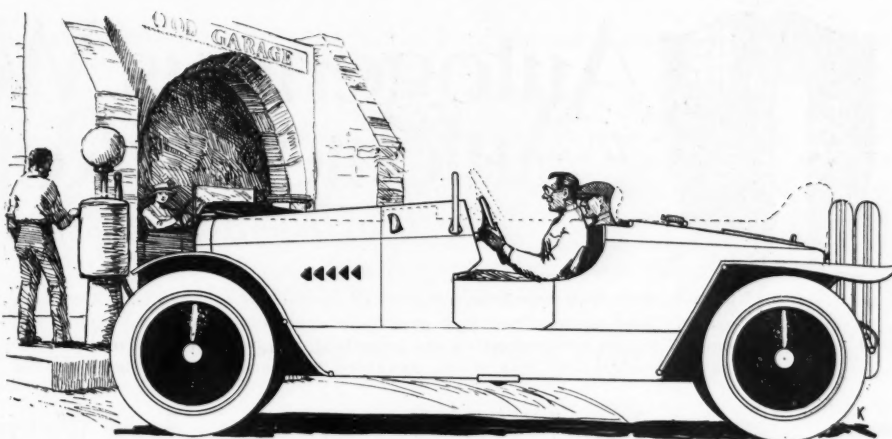


Fig. 15—A 1917 four-passenger National converted into a speedster. Two tires or wheels can be carried on the back

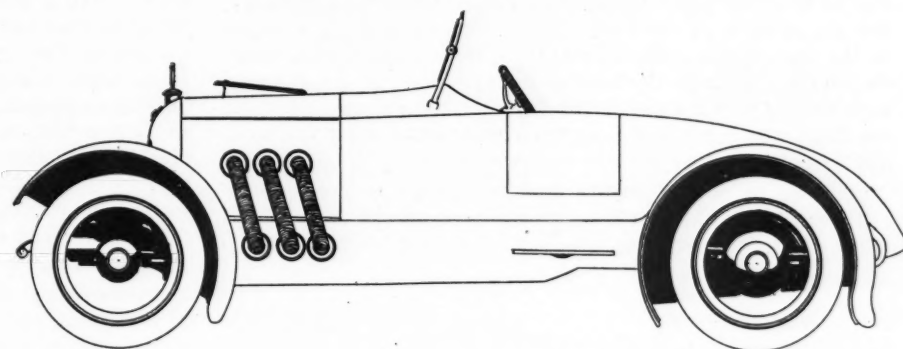


Fig. 16—Suggested design for converting a 1914 Cadillac into speedster

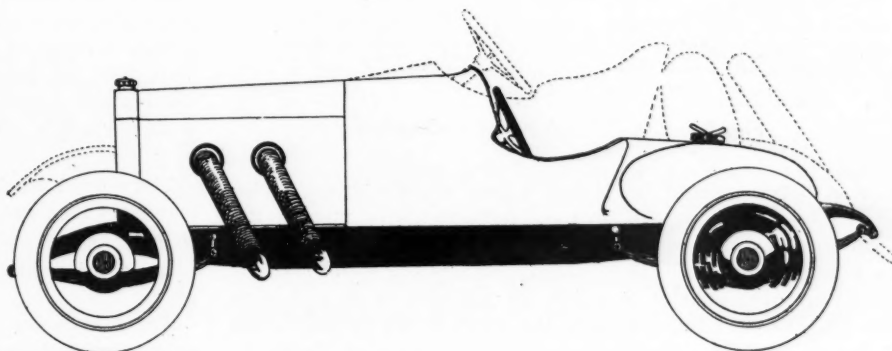


Fig. 17—How an Overland 75 might be converted into a speedster

3—Do you advise enlarging the valves? If so, what size valves should be used?

4—What do you think of drilling the pistons and rods? Will they give good service?—C. F. Culpepper Birmingham, Ala.

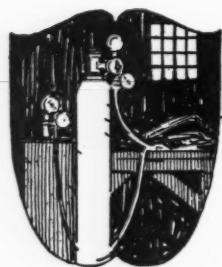
1—The gear ratio of this car is 3.75-1.

2—Yes. A 3-1 ratio should suffice for all ordinary road work and if the engine is in good shape the car should be fairly speedy.

3—When you start enlarging the valves, you run into a lot of work. It means you will have to make or get somewhere a manifold to take care of the larger passages and in addition a larger carbureter will have to be fitted. To determine the right valve size see how much stock you have between the valves now and you can judge how much of the metal can be removed and still leave enough. Usually a valve can be in-

creased anywhere from 1-16 to 1-8 in. over its present diameter. With bigger valves and carbureter you would probably get a lot more power.

4—We do not believe in your case much will be gained by drilling the pistons. In the first place, after they are drilled you have to make sure they balance and this means that the connecting rods have to be balanced along with them. You have to take away quite a lot of metal on the average iron piston to make any great difference in the weight and oftentimes this is done at the sacrifice of strength. A really better plan, if you want light pistons is to fit a set of either aluminum alloy or lightweight cast iron pistons such as advertised in *Motor Age*. Lighter pistons mean the engine will run with less vibration, other things being equal.



Autogenous Welding in Automotive Repairs

By Thomas P. Bowman



This is the seventeenth installment of a series of articles that are being published in MOTOR AGE each week. The author has had practical experience in motor car repairshops which enables him to present first-hand information on practical welding in a clear and concise manner. No difficulty should be encountered in this work, provided the reader will apply all the methods given herein.—Editor.

Part XVII—Practical Methods in Welding Cylinders

METHOD NO. 35

The first break to be repaired in the cylinders shown in Fig. 82 is in the water jacket. The second break is on the flange, and the third is on the water jacket. The fourth, is a crack on the head of the cylinder, extending from a spark plug thimble over the dome to the bore of the cylinder. If any of these were welded cold the casting would break from expansion when the flame was applied to it or from contraction after the weld had been made.

In order to overcome this, it is necessary to preheat the cylinder. To do this build a little furnace around it by means of fire brick. In order to give this furnace draft, the bottom

oroughly lighted and the cylinder has become slightly heated, more charcoal should be added until half the casting is covered. Then a piece of asbestos should be placed over the top of the furnace and a few holes punched in it to allow for draft.

Leave the cylinder in the furnace until it is brought to a dark red heat. Then turn the cylinder up so the part to be welded is accessible and replace the asbestos sheet and cut a hole in it so that the cylinder can be reached by the blowpipe and rod. The crack in the cylinder should have previously been chipped out. Weld this crack exactly as described before, but use a smaller welding head. Never take the cylinder out of the fire to weld it and never let the fire go out during the welding.

After welding, add more charcoal to bring the cylinder up to an even heat, and leave it in the furnace to cool slowly. Care must be taken that the metal does not run through and settle in the water jacket. Be sure to work out all dirt or scale, and not leave any pinholes or blowholes. In order to prevent the bore of the cylinder from scaling, before it is placed in the preheating furnace give it a slight coating of oil, and then apply a thin coating of flake graphite, which is a form of carbon. This may be done by taking the graphite in the hand and throwing it against the oily side of the bore. After welding is finished, this may readily be cleaned off with a rag or piece of waste.

The second crack can be welded by preheating in the same manner. It is not necessary, however, to preheat it so much. It is necessary only to heat the cylinder to a blue heat.

The third crack should be welded in exactly the same manner as the first.

The fourth crack should be treated a little differently, because the crack is on the inside of the water jacket. A portion of the outer wall, over the crack, must be removed. This is done by drilling. The crack is then chipped out and the casting

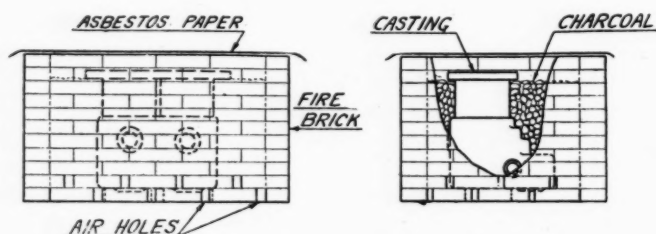


Fig. 81—Small furnace for preheating

row of bricks should be placed 1 inch apart. The cylinder should be placed in this furnace with the bore up and the head of the cylinder resting on two bricks. The furnace should be built so that there is 6 inches between the walls and the cylinder, space enough to allow the cylinder to be turned in the fire without knocking down the walls of the furnace when it is time to weld. About three shovels of charcoal should be placed around the cylinder at first and a little kerosene put on it before it is lighted. After the charcoal has become thor-

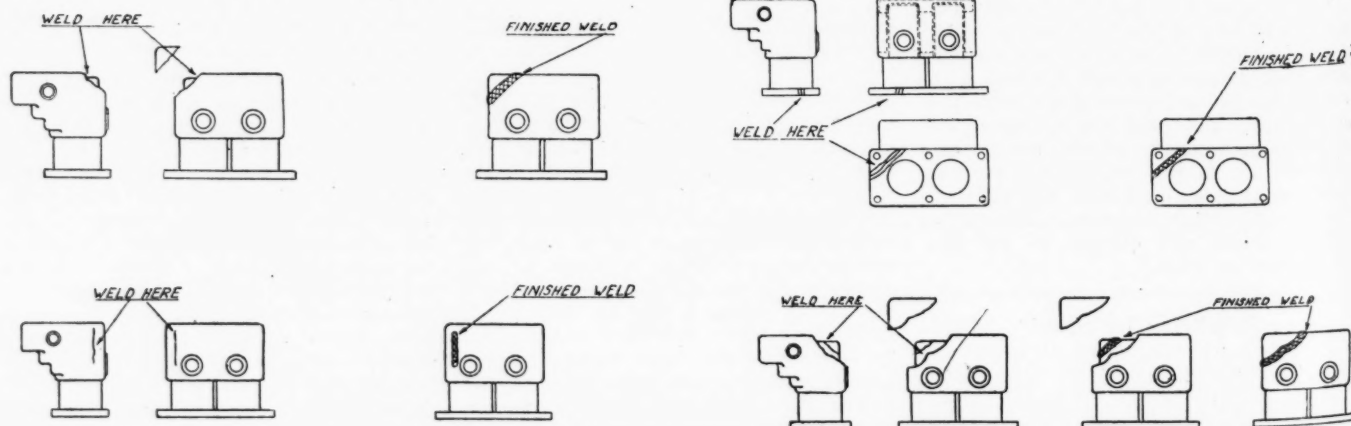


Fig. 82—Showing processes in welding cylinders

placed in a preheating furnace, exactly as described for the first and the welding is carried on in the same manner. When the weld is finished, and the casting is still hot, the removed portion is placed back into the outer jacket and welded in. In order to hold this patch in position while it is being welded, a piece of cast iron rod should be welded to it to serve as a handle. After the patch has been welded in, this rod or handle can be cut off.

After the cylinder has been welded and cooled off, it should be tested to be sure that the weld is entirely tight. Where it is possible this should be tested with water pressure. If it is impossible to do this, the water jacket should be filled with kerosene because kerosene penetrates a crack or pinhole faster than water.

METHOD NO. 36.

Further practice in the use of preheating for welding cast iron objects is given here. Crack A, (spoke), is welded first. The crack is to be beveled out in accordance with previous instructions. The wheel is then placed in a preheating fire which will heat the section shown in Fig. 82. The preheating should cover a spoke on each side of the broken one. While the object is still at a red heat it should be welded and then

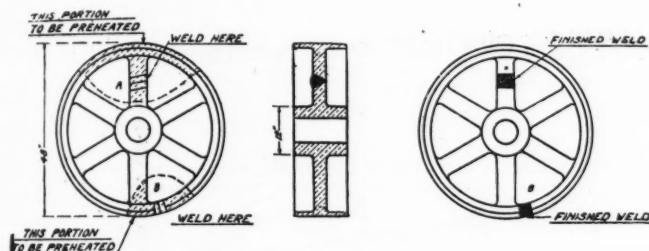


Fig. 82—Welding wheel

cooled in the preheating fire and protected from drafts by means of asbestos paper. Crack B should be welded after the casting is cooled at the opposite end. The crack should be chipped out or v'd properly and the casting then placed in another preheating fire. The casting should be preheated to a dull red heat and the welding carried on while at this temperature and cooled in the same manner as crack A.

When the crack in the rim is between the spokes, a preheating fire should be built between the spokes away from the hub. When the crack is near the spoke, the preheating fire should

include the part of the spoke and a part of the rim, but kept away from the hub.

METHOD NO. 37

The object of this problem is to give practice in building up holes in cast iron and in controlling the flow of melted metal. Select the proper size welding filling heads. The piece should be brought up to a dark red heat, first by means of the welding flame applied across the area where the hole is located. If a larger casting than that shown is to be welded, a charcoal fire should be used for this preheating. Because cast iron will flow easily when melted, the underside of the hole should be backed up with a piece of fire brick, asbestos or steel plate.

The edge of the hole, at one point, should be brought to melting heat by use of the welding flame. A beveled surface

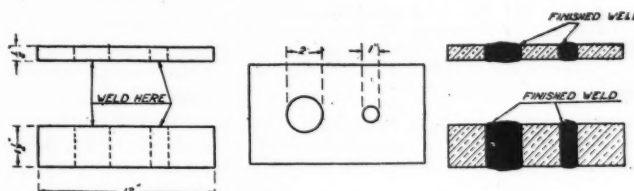


Fig. 84—Building up holes in cast iron

should be formed to which the welding rod is added. This operation is carried on all around the hole until it is completely filled; the operation ending in the center and not on the side.

The manipulation of the welding rod and blowpipe is exactly the same as for the welding of cast iron. The general procedure in filling the hole is similar to that used in steel. Be sure that the bottom edges of the hole are melted and thoroughly welded. The surface of the weld should be cleaned off and allowed to cool slowly.

The $\frac{1}{2}$ -in. plate should be handled without backing up the hole. This is to give further practice in the controlling of melted cast iron.

METHOD NO. 38

The object of this is to give further practice in the control of molten cast iron. A lug should be built on the plate used in Method No. 37. The method of doing this is the same as that employed in all cast iron welding. Machining being an additional operation involving more expense, it is important that the lug be built up to the shape finally required.

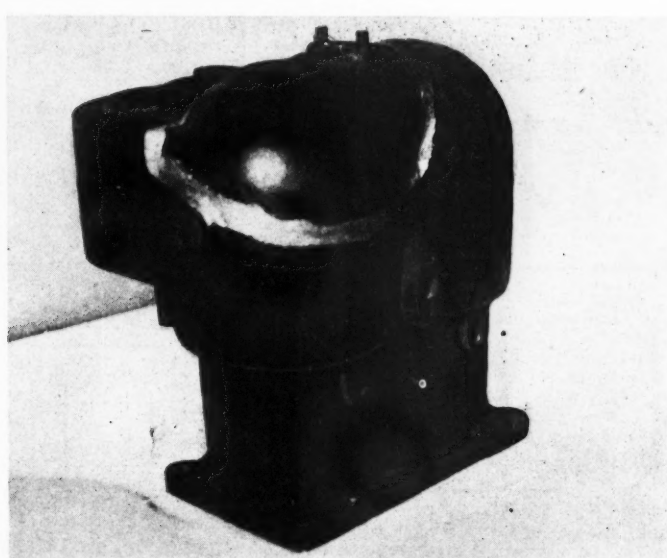
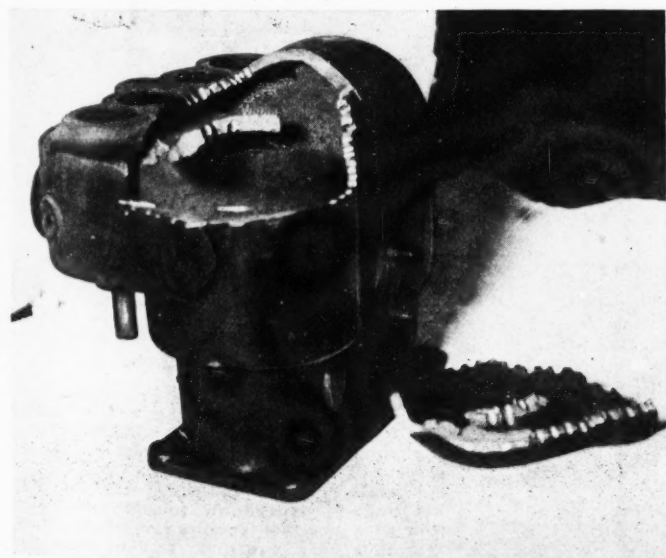


Fig. 83—Welding job on cylinder—left, cylinder ready for job; right, job completed

Garage Planning

Service Station Arrangements

No. 112

To Alter Shop for Ramps

Q—We have an old building and wish to alter it so we can have ramps between the wall and last row of posts. The one leading to the basement is to start outside in front and end at the back of the building, and the one leading to the second floor to start at the back of the building and end at the front, being built above the other. Please show how this can best be done.—Henry Greenhold, New York.

There is not enough distance from front to rear to get a practical grade from the first to the second floor, conse-

quently we have started at the center aisle and returned again to the center aisle on the second floor. This will give you a gentle grade of about 14 per cent and there will be no lost space as these approaches would have to be kept open anyway. The basement ramp is a little more than 16 per cent grade and is all right without a turn. Since the post, P, is too near the wall to allow a turn being made into the ramp with any degree of safety we would by all means move it a little further away. The simplest way to do this would be to go clear to the basement with a 10 by 10

post beside the old one. Some ingenious builder might plan a bracket or overhead truss to support this small section of the second floor, thus doing away with the post.

The method shown of forming the ramp consists of inserting beams, about 6 in. by 12 in. between the posts supported on the brackets, T, attached by heavy bolts or notched into the posts. A corresponding beam is attached to the wall in some mechanically approved method, probably hung on iron stirrups and secured by expansion bolts. Then the joists, which have been removed, are replaced on these

MOTOR AGE is receiving many inquiries or garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and inquirers are urged in asking for such plans to be sure to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

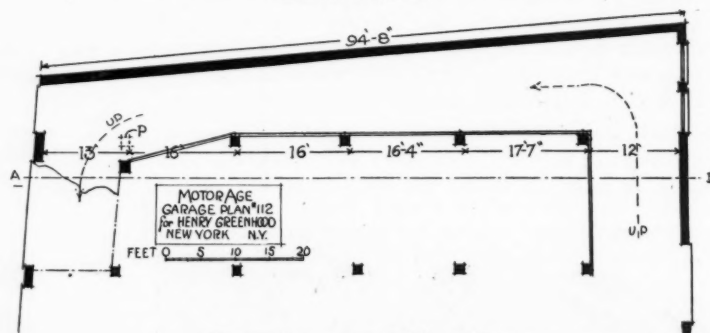
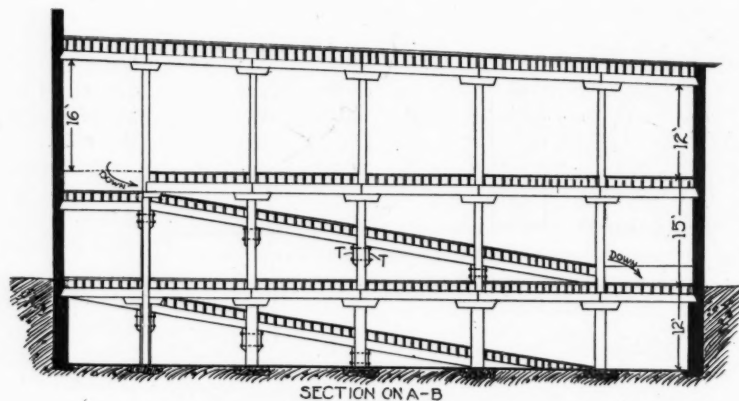
What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

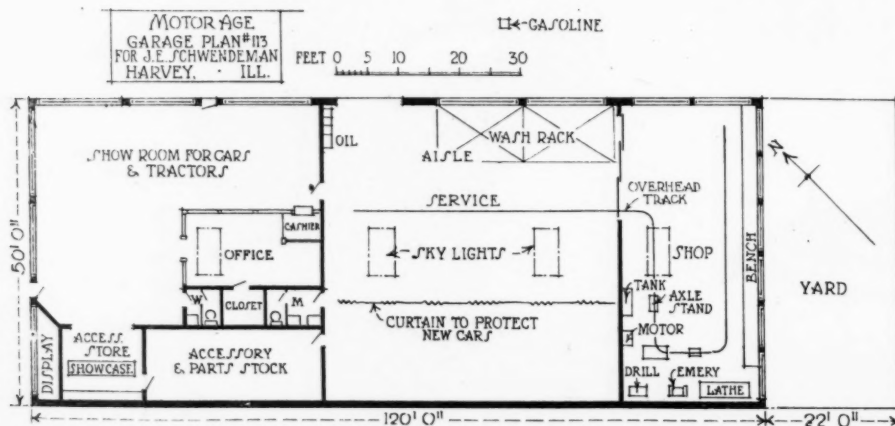
Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.



Ramp in garage of limited space



Space shown for yard might be better used

beams and the floor of the ramp laid on them. This method allows the use of the joists again and makes the floor run longitudinally, reducing vibration.

No. 113

For Corner Lot

Q—I am going to build a sales and service station in the near future. The lot is on a corner, 50 ft. by 42 ft., facing northwest on one of the principal streets of the town.

I wish to make the front part of the building large enough to hold at least four cars and two tractors and, if possible, a tractor plow and disk, besides room in one corner for an accessory department and office. Back of this I wish to build a stockroom and a room to store new cars

and tractors and back of that a work shop to take care of service work with a wash rack in one corner. Please advise me as to the best way to locate the lightning. I do not want an entrance for cars in front but on the side and in the rear. I expect to construct the building 50 ft. by 120 ft. of brick without posts inside with a corner street entrance.—John E. Schwendeman, Harvey, Ill.

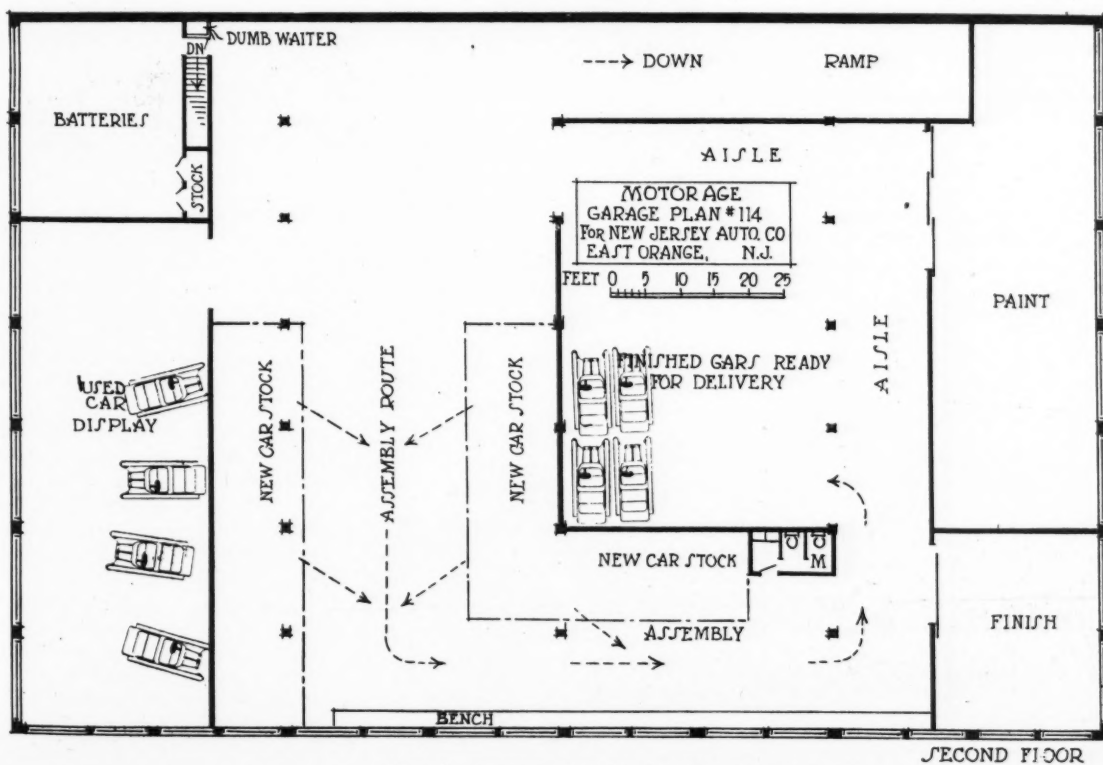
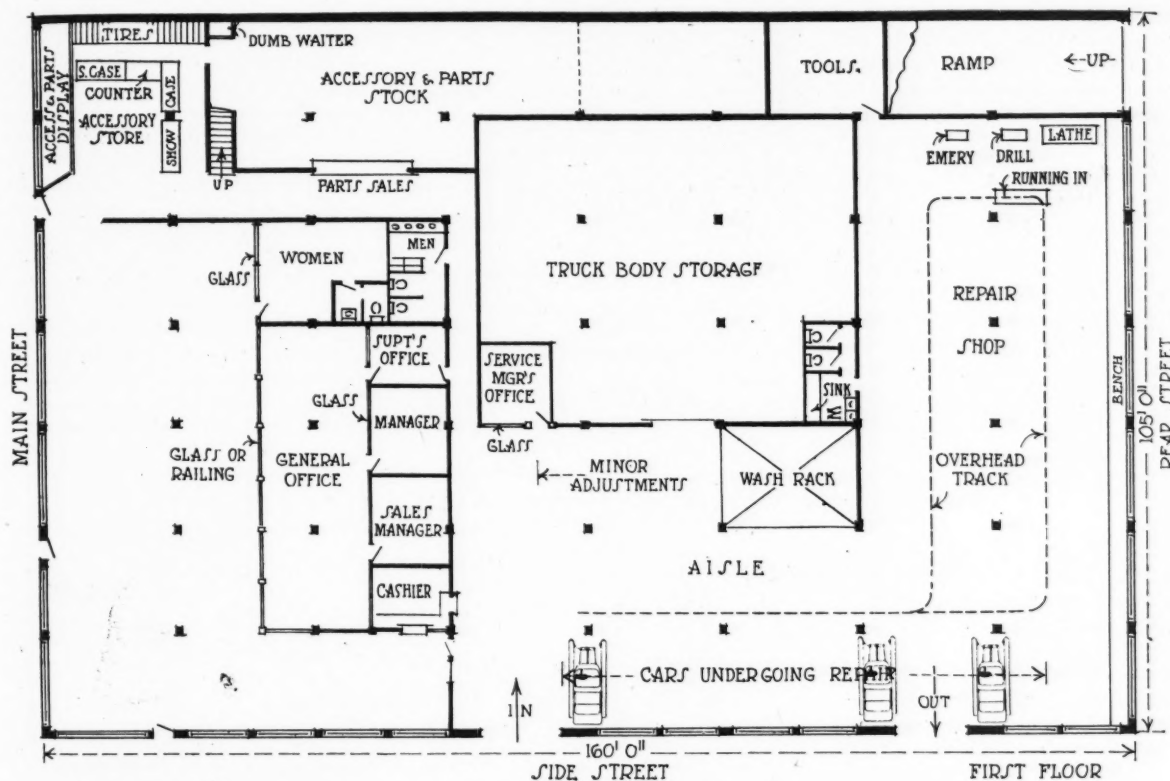
While we have designed a sales and service building for you, leaving a 22-foot strip at the rear of the lot, we do

not see the use of this reservation on a corner lot. It will be of no use except to collect junk and make your place look untidy.

Why build clear to the alley, dividing the extra 22 feet perhaps seven feet to the shop and fifteen to the storage and service station? This will make a better balance between your sales room and your service department. A heavy canvas curtain in front of the new cars

stored against the wall would offer protection but a series of sliding doors would be even better. It is planned to back the cars undergoing repair up to the curtain and leave as aisle on the street side of this space.

You speak of wanting the office back of the accessory store. We believe the arrangement we show is better, placing the office in a more advantageous position and at the same time giving the stock-



Plan for garage fronting on three streets

room the position of the value it deserves.

Do not put an entrance in the rear, as it will simply take an eight or ten foot strip out of your shop which will have to be kept open for passage and consequently of no use in the shop work. You will have no serious trouble with lighting for small skylights will light the interior portions very well.

A corner entrance is a convenience and would no doubt be best for a cigar store or a grocery store where people are running in and out, but in a sales room we think the corner is too valuable as display space to be given up to an entrance. If people see something through the window they want to examine they will find a way to get in.

No. 114

Large Sales and Service Plant

Q—We are enclosing rough sketch of a level rectangular lot 105 by 160 ft. fronting on three streets. The frontage is 105 ft. on the main and rear street and 165 ft. on side street.

One street is 60 ft. wide from curb to curb with two street car tracks in center and 12 ft. sidewalks. This is a main thoroughfare with heavy traffic and valuable frontage which leads us to believe that an

entrance from one of the other streets would be preferable, as traffic there is light.

We contemplate the erection of a 2-story garage with either an elevator or an incline to the second floor. We intend to have eleven departments—sales, parts, accessories and tires, shop, assembly, paint shop, battery station, washing and greasing department, commercial body storage, second hand car, and minor adjustments and emergency repairs. We sell the Ford car and wish to exhibit about five machines in the show-room. We employ about 30 men exclusive of our sales force.

We expect to carry \$20,000 worth of spare parts and a like amount of tires and accessories. We will not garage private cars. Our office department will consist of general office, manager's private office, sales manager's office, superintendent's office, and cashier's office. The service office will be separate. We wish also to include a ladies' waiting room, and would be pleased to have your suggestion as to the location of the heating plant.—W. N. Goodrich, vice president, New Jersey Auto Co., East Orange, N. J.

There are so many ways a plant of this size may be treated that it is always more of a problem to hit upon the best course of action than to design the building after the general scheme has been adopted.

As we see it, the mechanical end of your business is virtually in two parts, one

dealing with service, maintenance and repairing, and the other assembling and equipping new cars.

Considering the second phase we adopted the ramp believing that since you had plenty of room it would be more economical to drive your trucks loaded with knocked-down parts directly up the ramp to the second floor and unload them directly where they are to be used in assembly. The parts will be distributed along the assembly route in the order needed, frame and wheels first, etc., so that when a car is assembled it can be pushed along as fast as parts are added. When completed cars are stored in the central space ready for delivery.

The service and repair department is also built on the progressive idea as you will note from the drawing. The dark parts of the first floor we have utilized for storage of parts, accessories, truck bodies, and tools, reserving the outside well lighted areas for work and display.

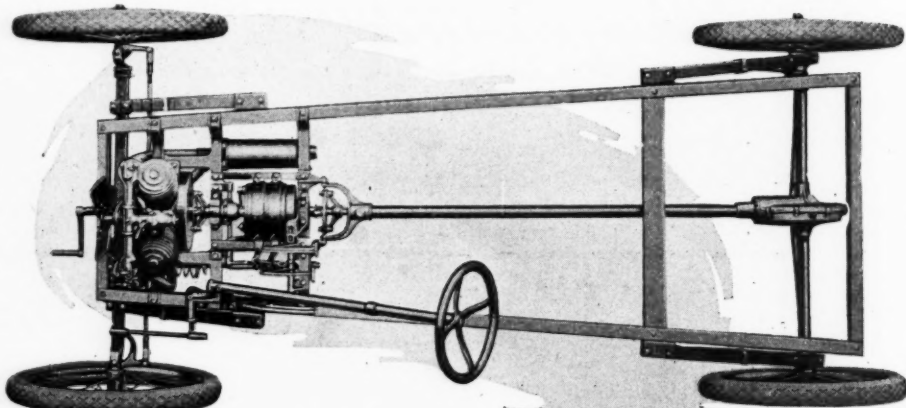
The only part of the layout with which we are not thoroughly satisfied is the office section and this is only as regards light. Battery work can be handled over the parts sales counter which is in communication with the second floor battery room by a dumbwaiter.

Spacke Light Car Announced

DETAILS of the Spacke light car which was announced last May in Motor Age, are now available. Since the design is a composite enlargement of many of the cyclecars of a few years ago, description of the car is given here.

The car is for two passengers, the wheelbase being 90 in. and the tread 46 in. The power plant is a two cylinder air cooled engine of the V type. Drive is through a two speed planetary transmission and an internal expanding clutch to an inclosed propeller shaft and a conventional bevel gear rear axle without differential gears.

The engine is set transversely in the frame, so that the incoming air through the front cools the cylinders equally. A cross shaft at the front of the engine crankcase casting serves as a drive for the cams and the Atwater-Kent ignition distributor at the left hand end of the shaft. A cooling fan is driven by a belt from the crankshaft.



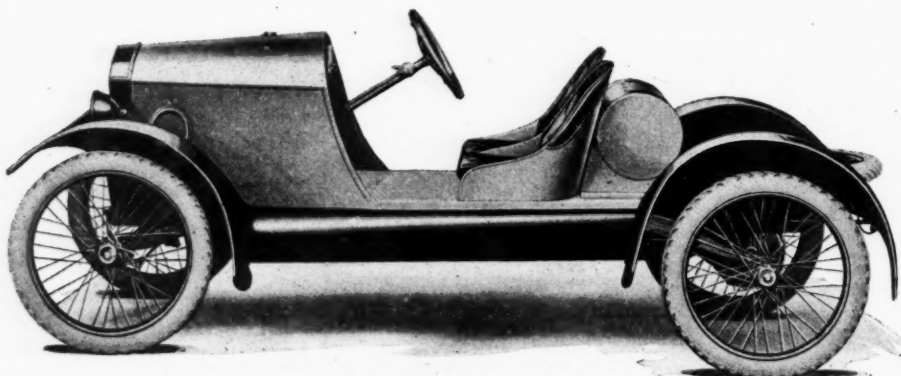
Chassis of Spacke light car

There is a notable improvement in the layout of the small car as compared with the creations brought out in 1913 and 1914. In the old days of the cyclecar

belt drive and cable steering seemed to predominate. In the Spacke light car the belt has given way to the shaft drive and cable steering supplanted by the gear type using a fore and aft drag link.

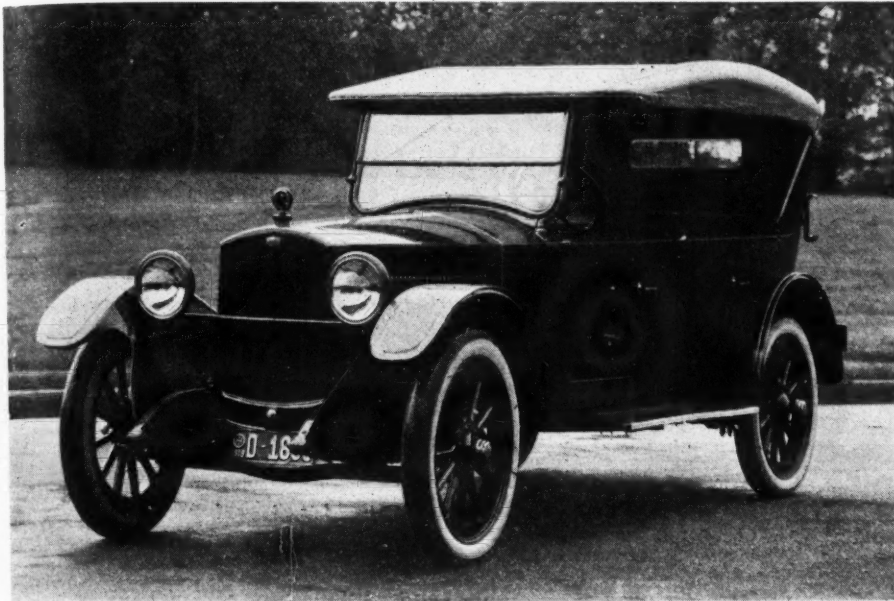
When light cars were first brought out in this country, the quarter-elliptic spring was popular with most makers and it has been retained on the Spacke car. This makes a much easier production job and is entirely satisfactory for a light car. The drive is taken through a torque tube and yoke attached to the gearset mounting.

The frame is a straight channel section. Secured to the frame by rigid spring clips are the quarter-elliptic springs, both front and rear. Wire wheels with 28 by 3 in. tires emphasize the fact that the car is light in weight. The price of \$295 include electric lights, storage battery and tools.



Side view of Spacke car

New Grant Six is Larger and Has New Body Lines



Semi-side view of new Grant touring car

THE new Grant light six retains few of the features of previous models. The exterior has been changed completely by using a bevel edge type of body and a new radiator design with a straight core instead of the former curved one. Next year 20,000 of the new model will be built, double the present rate of production.

The new model has a 2-in. longer wheelbase than last year's, now being 118 in. and employs a six-cylinder engine of the same general design, having a bore and stroke of $3\frac{1}{8}$ by $4\frac{1}{2}$ in., the bore being increased $\frac{1}{8}$ in.

Conventional practice has been followed in the entire design. The only engine change, with the exception of the increase in bore, is the alteration of the flywheel housing to take a Borg & Beck clutch, which replaces the cone type formerly used.

Atwater-Kent ignition is now standard with a Wagner 2-unit electrical system. A Stromberg carbureter and Stewart

Price, open cars, \$1495, closed cars, \$2450.

Wheelbase—118 in.

Engine, six-cyl. valve-in-head, $3\frac{1}{8} \times 4\frac{1}{2}$ in.

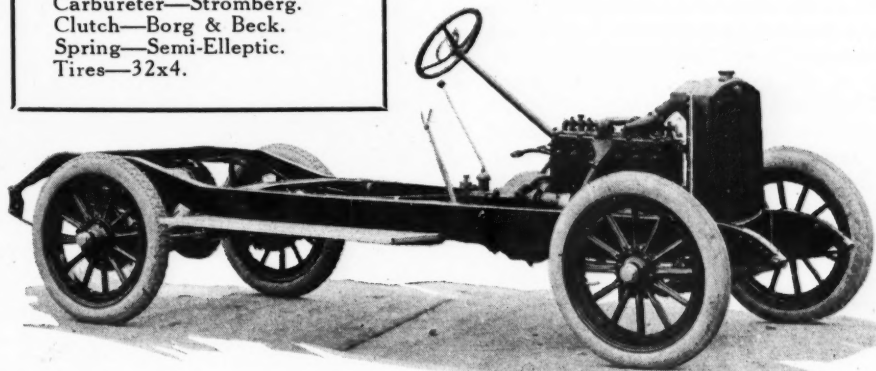
Ignition—Atwater-Kent.

Carbureter—Stromberg.

Clutch—Borg & Beck.

Spring—Semi-Elliptic.

Tires—32x4.



Chassis of Grant car

vacuum tank are used in the fuel supply line. A Jacox steering gear, slightly larger than last year's type, has the spark control mounted on the steering wheel instead of on the instrument board. The gear shift is now S. A. E. standard with a convenient shift lever location.

Final drive is Hotchkiss, through 56 by 2 in. underslung springs with Spicer universals in the driving line. The front springs are semi-elliptic, 38 by 2 in.

Grease Cups Are Eliminated

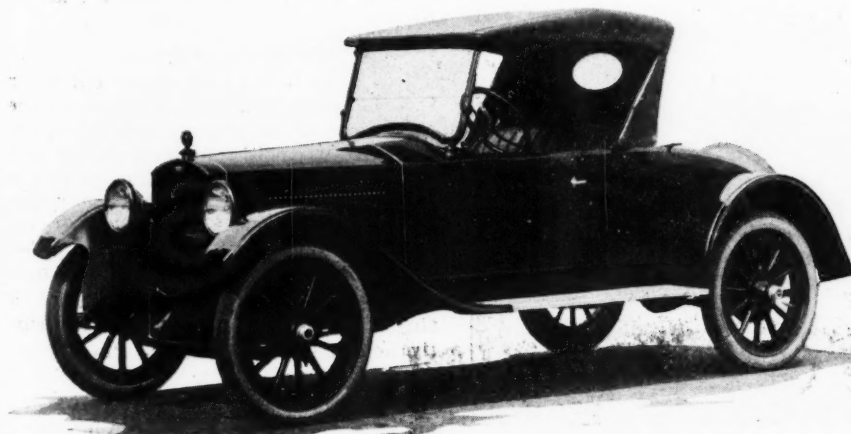
Columbia axles are employed front and rear. The rear is a floating type, with 12 in. internal and external brakes. As a maintenance feature, the spring shackles, rear axle and cross shaft brake mechanisms are bushed with oilless bushings. All grease cups, except three on the front axle, are eliminated. The spring shackles have a thrust washer of the same material as the oilless bushings placed between them and the spring eyes to prevent any tendency to squeak. These parts are lubricated permanently. Wheels are wood, with demountable rims for 32 by 4 in. tires.

A new type of frame of bottle neck design has been adopted, permitting a turning radius of 39 ft. 6 in. It is unusually wide at the rear end and of rather deep section, eliminating any necessity

for a running board to frame splasher, as the running boards are extremely wide and are attached to the frame on a level with the lower part of the side rail.

The lower line of the bevel edge on the body is not broken off abruptly at the cowl but continues across the hood and merges into the radiator. Marshall springs with real leather upholstery comprise the cushion equipment. Side curtains are made to open with all doors. Usual equipment is provided, in addition to a Kellogg tire pump and a motometer.

Bodies are finished in Grant blue as standard color, with black enamel hoods and fenders. Four body types are available, which includes a 5-passenger touring car, a 3-passenger roadster, a 4-passenger coupe and a 4-door sedan.



Side view of new Grant roadster

New Avery Cultivator Has Six-Cylinder Engine

More Power and Greater Versatility Mark New Farming Machine

MORE power in the engine and greater versatility in adaptation are characteristic features of the new Avery motor cultivator adopted by the company after three years' experience in building similar machines. The new machine differs from previous Avery models principally by the substitution of a 6-cylinder engine for the 4-cylinder engine formerly used. Experience with the motor cultivator showed the necessity for more power than the old engine delivered if the machine was to reach its full usefulness on the farm. The frame, transmission and final drive on the new model are the same as those used on the older machine.

Has Six Cylinder Engine

The 6-cylinder engine is vertical type, with 3 by 4 in. bore and stroke, and a normal r. p. m. of 1200. It is L head with cylinders cast in block. The engine is completely water jacketed and circulation is thermosyphon. The upper crank case is integral with the cylinder block, the lower part of the crank case or oil pan being held to the upper part by through bolts.

The governor is centrifugal type, operating a butterfly valve in the intake, and is completely enclosed in a compartment in the forward end of the crank case. Ignition is K-W high-tension, with impulse starter, and further equipment is Kingston 1 in. carburetor and Bennett air cleaner. The clutch is of the multiple dry disk type of the company's own design. For use on the belt a 10 in.

pulley with 5¼ in. face and 800 r. p. m. is furnished. The engine is mounted longitudinally on the frame.

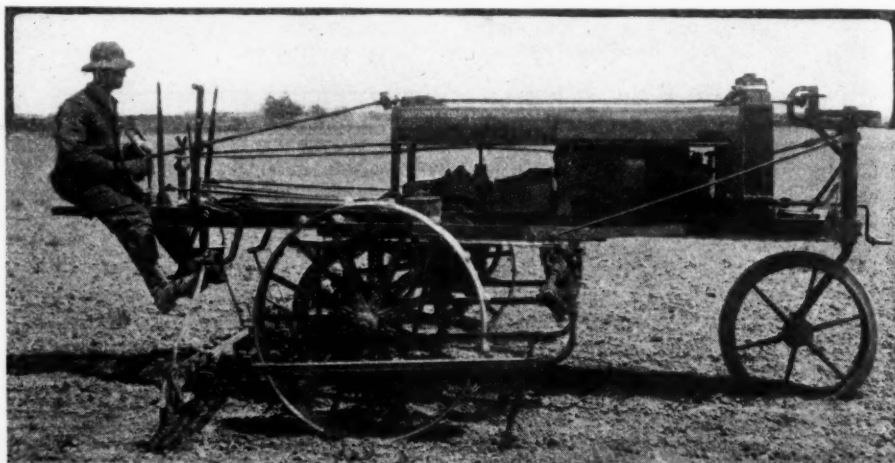
Cultivator 3-Wheel Type

The cultivator is a 3-wheel machine with the steering caster wheel in front. This is operated by a hand wheel through a set of spur gears. Differential brakes on either side, controlled by the operator, permit quick turning when necessary, the cultivator pivoting on the locked wheel. In this event the steering wheel casters automatically.

In order to give versatility in use, the machine is built in different widths,

measuring from center to center of the drive wheels. These are 92 in., adjustable for rows from 40 to 48 in. apart; 80 in., adjustable for rows of all spacing from 36 to 42 in.; 70 in., adjustable for rows spacing from 28 to 32 in. By substituting a double wheel in front, beets and other row crops spaced as low as 20 in. may be cultivated. Extreme length of the cultivator is 184 in., with a 30 in. clearance under the frame.

All regular gangs for both checkrowed and listed corn are furnished. The machine can also be used for planting corn and, by special equipment, for planting and cultivating cotton, beans, peas and beets.



Avery at work in beet field



Avery used as grass cutter on golf course

By dropping the cultivator gangs and attaching a special drawbar the machine may be used to pull any implement on the farm not requiring greater power than that of two horses. Special equipment also permits the use of large lawn mowers for parks, golf links and the like.

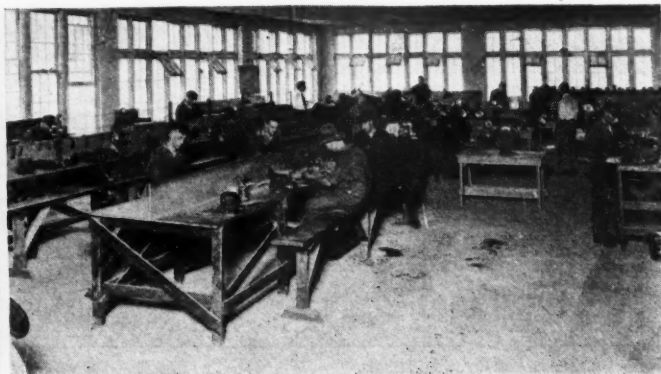
Does Everything But Plow

In short, the Avery motor cultivator is designed to do all those things on the farm for which horses hitherto have been required with the exception of such heavy work as plowing. On the belt it will take care of all light farm power driven machinery. In cultivating the capacity of the Avery machine is from 16 to 18 acres per day.

The company has also designed a single row motor cultivator for the cultivation of cotton for the southern market. This machine is mounted higher than the regular machine, has two steering wheels in front and has 42 in. clearance instead of 30 in.



The Vulcanizing Department



Section of Electrical School

"Learn by Doing" in Iowa School

Mechanics' Institution Gives Practical Repair Course

"**L** EARN by doing," is the motto of the Iowa State Automobile and Tractor school, Sioux City, Iowa, which offers complete courses in the practical operation and maintenance of motor cars, trucks, tractors, airplanes, isolated lighting plants and stationary gas engines. In this school the student performs all work himself and spends no time in a lecture room. It is the policy of the school that more can be learned by actual contact with the machinery and appliances than listening to a lecturer expound on the principles involved.

Departments Are Separated

The equipment of the school is complete. Various parts of the car are divided into groups. Each of these divisions has its principal parts. The engine division, for example, comprises the general repair shop and the testing department. In the repair shop the student is taught the hows and whys of repairing. The operation of the lathe is learned. Trueing crankshafts, fitting bearings, grinding valves all come under the direction of this department.

The electrical department is arranged in an interesting fashion. One room in the electrical division is fitted with a number of tables, each equipped with a complete electrical car outfit. The edge of the table is fitted with a dash, on which are mounted headlights, switches, and an ammeter. The generator and starting motor are mounted on the table. This method places the electrical equipment before the student in its proper position, the various parts being arranged with a view of duplicating the arrangement on the car.

Storage battery work is part of the electrical equipment department. Here the student dissects the battery. He is taught lead burning, power methods of charging and testing. In this school the student makes his own batteries from the separate parts, mixes the electrolyte, and charges the battery after it is assembled.

Welding has a department of its own. The equipment is large enough to handle all kinds of welding a wrecked motor car might need for its repair. In all these departments the student is taught shop

management. A simple bookkeeping system outlined by the school is taught, which will enable the student to run his own business.

The school course lasts eight weeks and the tuition for the complete course is \$85.00. This includes a free membership to the Y. M. C. A. in Sioux City, with full privileges of the swimming tank and gymnasium. The school conducts its own boarding and rooming house for the men.

A Bleriot monoplane with several different types of engines is provided for the airplane department. The student is taught how to mount the engine in the airplane frame and the general knowledge necessary for repair work on airplanes.

WANTS AERONAUTIC DEPARTMENT

Washington, Oct. 11—A new bill providing for a department of aeronautics has been introduced in Congress by Representative Curry of California. This bill, which follows one introduced by him July 28, is a combination of his original bill, the bill introduced in the Senate by Senator New and also contains some additional features based on the international air regulations as provided for in the peace treaty.

Instead of asking for a secretary of aeronautics as in his previous bill, Mr. Curry now urges the establishment of a department with a director at the head with a salary of \$12,000 a year. The bill, despite its numerous changes, remains chiefly an act which would establish a department of aeronautics primarily for a serial defense of the United States. It includes among other new provisions, certain activities which would be helpful to commercial aeronautics, such as the collection and dissemination of information, the issuance of licenses for aircraft and the promulgation of regulations to cover international and interstate flying. It also authorizes the director of aeronautics to establish serial routes throughout the United States, but provides that these will be selected primarily to "insure the most rapid concentration of the Air Forces in times of war or threatened hostilities."



Engine Department of Iowa School

Tire and Rim Sizes

Motor Age Maintenance Data Sheet No. 58

One of a series of weekly pages of information valuable to service man and dealer—Save this page

1913 Cars

CAR AND MODEL	Make of Tire	Size of Tire	Style of Bead	Type of Rim	Make of Rim
Abbott-Detroit, D.	Goodyear	34x4		Clincher.	Booth
Abbott-Detroit, E.		36x4½		Demountable.	
Adams-Farwell, 9.		36x4½			
A. E. C., 6-45.		36x4½			
A. E. C., 6-60.		37x5			
Alco, 7-16.		32x4			
Alco, 11-60.		37x5		Q. D. C.	
Alpena.		36x4		Demountable.	Baker
American Scout, 22-A.		36x3½		Demountable.	
American, 34-A & 32-A.		37x4		Demountable.	
American, 54-A & 56-A.		41x4½		Demountable.	
Ames, 44 & 45.		36x4			
Amplex, F.		36x4½		Demountable.	
Apperson, 4-45.	Goodyear.	34x4	S. S.	Demountable.	Baker
Apperson, 4-55 & 6-50.	Goodyear.	36x4	S. S.	Demountable.	Baker
Arbenz.		36x4	S. S.	Demountable.	Stanweld
Atlas, 12.		37x5			
Auburn, 4-33.	Goodrich.	35x4	Clincher.	No. 2	Universal
Auburn, 4-40-L.	Goodrich.	36x4	Clincher.	No. 5-D	Universal
Auburn, 6-45.	Goodrich.	37x4½	Clincher.	Demountable.	Universal
Auburn, 4-37.	Goodrich.	35x4	Clincher.	No. 5 Dem.	Universal
Austin.		36x4½		Q. D. C.	Stanweld
Allen, 36.		34x4		S. S.	Firestone
Bergdoll, 30 & 40.		34x4			
Bergdoll, 40.		36x4			
Buick, 25 & 24.		32x3½		S. S.	Baker
Buick, 31 & 30.		34x4		S. S.	Baker
Buick, 40.		36x4		S. S.	Baker
Burg, S.		36x4			
Burg, R.		36x4½			
Cadillac, 1913.	U. S.	36x4½	Dunlop or Q. D. Clincher.	Q. D. Dem.	Baker
	Hartford.			Kelsey-Booth Split Q.	Kelsey
	M. & W.			Dem.	
Cameron, 29-A.		32x3½		Kelsey Universal Q. D.	Kelsey
Cameron, 28.		32x3		Dem.	
Cameron, 30 & 32.		34x3½			
Carhatt, K. & B.		34x4			
Carroll, 4-E.		36x4			
Carroll, 4-D & 6-C.		36x4½			
Cartercar, 5.		36x4			
Case, N-30.	Goodyear.	34x4		Demountable.	Firestone
Case, O-40.	Goodyear.	37x4½		Demountable.	Firestone
Chadwick, 19.		36x4½			
		37x5			
Chalmers, 17.		36x4		Demountable.	
Chalmers, 18.		36x4½		Demountable.	Stanweld
Chandler, 14.	Goodrich.	34x4	Plain & Non-Skid.	S. S.	Firestone
	Goodyear.				
Chevrolet, C.		35x4½		S. S.	Detroit
Cino, 440 & 450.		34x4			
Cino, 660.		36x4½			
Coey.		36x4			
Colby, C.		34x4½			
Colby, E.		36x4½			
Colby, C-6-60.	Kelly-Springfield.	37x5		Q. D. Dem.	Stanweld
Cole, 40 & 50.		36x4		Q. D. Dem.	Firestone
Cole, 60.		37x4½		Q. D. Dem.	Firestone
Columbia, 85 & 88.		36x4½		S. S.	
Corbitt.		34x4		Q. D. C.	
Correja, T, D, S & R.		36x4			
Correja, A, B & C.		34x3½			
Correja, C, J, R & S.		34x4			
Craze.		37x5			
Crawford, 13-30.		34x4			
Crawford, 13-40.		36x4			
Crow Elkhart, C-6-A.		37x4½			
Crow Elkhart, C-6-B.		35x4½			
Croxton, B-6.		36x4½			

ABBREVIATIONS:

S. S.—Straight Side. Q. D. C.—Quick Demountable Clincher. Dem.—Demountable. Q. D. D.—Quick Demountable Detachable.

The Motor Car Repair Shop

Practical Maintenance Hints

Easily Constructed Wrecking Wagon

THE ever increasing number of motor cars throughout the entire country naturally brings a heavier toll in the way of collisions and other forms of wrecks which demand the services of wrecking and service wagons.

In a big city the wrecker is called upon to haul away motor vehicles which have gone through all sorts of difficulties and it is necessary to make quick work of the operation in order to prevent traffic congestion. It is because of this that a city wreck wagon must be a somewhat pretentious affair, capable of hauling a car away when either end is disabled, or when none of the four wheels may be in use. It is better in the long run to buy one of the attachments on the market, but if one must be built, this may help:

A simple form of hoist attached to an old car will be sufficient for ordinary

work and this outfit can be used for a variety of purposes. Any kind of box set back of the driver's seat will do for service purposes, and when a hoist is attached, the outfit is fairly complete.

Almost any garage or repair shop can make such an outfit for it calls simply for a job of pipe cutting and fitting with two pieces of the pipe to be bent and the making of a couple of brackets to carry the pipe on the frame or sill of the car.

By following the suggestions shown in Fig. 1 the job will be simple. Two brackets are required, so that the pipe may be secured to the frame. The inside hole of the brackets should be sufficiently large to take the outside diameter of a 2 in. pipe. The hoist frame may be made up of pieces of 2 in. pipe cut as shown, and bent to come well together at the top so as to shorten the distance between the uprights and

therefore make it stronger. Two T's or L's at the bottom and two more at the top will be required, and two plugs will serve to close the ends of the top T's or L's. A piece of 2-in. pipe should be cut sufficiently long to extend an inch on each side of the brackets and when the final assembly has been made, pipe caps can be used to close the ends of the horizontal piece and at the same time act as flanges to hold the lower T's on the uprights in place. The lower horizontal piece will pass through the brackets on the frame and also through the lower T's on the uprights.

A differential or chain hoist can be hooked to the short length of pipe at the top and at the same time another chain can be attached to this part and be made fast to a cross brace on the car to hold the top of the hoist in place.

A wrecked car can be hoisted as high as desired and then can be towed by attaching two short chains to the front axle of the wrecked car and to the frame of the tow car. When the back of the wrecked car is out of commission and it is necessary to lift the back end, the front wheels can be set straight and then locked by chains so the car will follow the tow car.

To Remove a Rusty Nut

Every mechanic has had the experience of wrestling with a nut which has become rusted to a stud or bolt. It is well enough to clip body bolts, stove bolts and the like, but there are other parts which

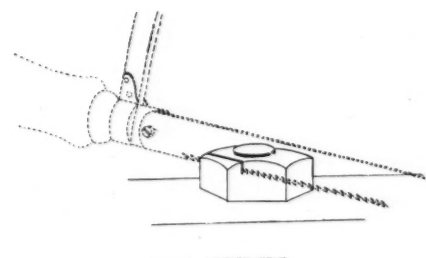


Fig. 2—Method of removing rusty nut must not be destroyed or even mutilated in the process of removal.

A simple operation and one which will always prove successful is shown in Fig. 2. The only tool needed will be a hacksaw. The operation is simply to make two cuts through the nut alongside the threads of the stud. A very slight tap with a hammer will then start the nut, for there is little left to bind it to the stud.

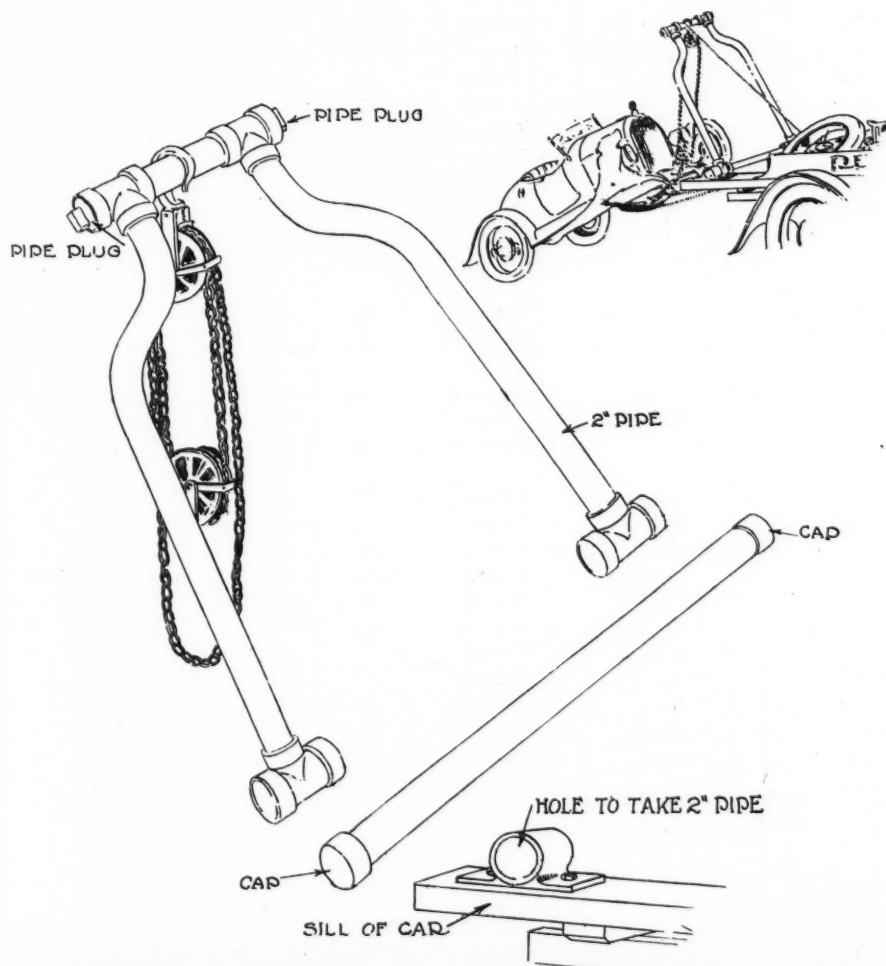


Fig. 1—Easily built wreck wagon and how it is used

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY		Wiring System	Type of Electric System	FUSES		
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.			Type	Volts	Amp
Liberty.....10B	Dual	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Willard.....	88	6	1	GI.....		
Locomobile....48-4-5	Dual	Berling.....	Hand.....	West.....	6	West.....	6	Exide.....	150	6	1	S.....	G. T.....	6 10
Maibohm.....B	Single	At-Kent.....	Hand.....	Wagner.....	6	Wagner.....	6	Willard.....	94	6	1	S.....	A 1.....	3 30
Marmon.....34	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Prest-O-L.....	120	6	1	S.....	Cart.....	20
Maxwell.....25	Single	Hand.....	Hand.....	Simms-Huff..	12	Simms-Huff..	12	Prest-O-L.....	35	12	1	GM.....	Cart.....	20
McFarlan.....127	Double	West.....	Hand.....	West.....	6	West.....	6	Willard.....	5 Amp. 27.8 h. p.	6	1	GI.....	5 A. G.....	6
Mercer.....Ser. 4	Single	Berling.....	Hand.....	West.....	6	West.....	6	Willard.....	90	6	1	S.....	Cart.....	10
Metz.....	Single	Conn.....	Hand.....	West.....	6	West.....	6	Willard.....	120	6	1			
Mitchell.....E-40	Single	Remy.....	Hand.....	Remy.....	6	Remy.....	6	Willard.....	100	6	2	GM.....	Cart.....	20
Moline Knight...L	Dual	Conn.....	Hand.....	Wagner.....	6	Auto-Lite...	6	Willard.....	117	6	1	S.....	Cart.....	250 20
Monitor.....	Single	Conn.....	Hand.....	Dyneto.....	6	Dyneto.....		Prest-O-L.....	110	6	1			
Moon.....All	Single	Delco.....	Auto.....	Wagner.....	6	Wagner.....	6	Exide.....	80	6	1			
Moore.....30	Single	Conn.....	Hand.....	A-L.....	6	A-L.....	6	Willard.....	80	6	2			
Nash.....	Single	Delco.....	H & A.....	Delco.....	6	Delco.....	6	Willard.....	100	6	1	S.....		
National.....6	Single	Delco.....	H & A.....	West.....	6	West.....	6	Prest-O-L.....	110	6	1	S.....	G.....	5
National.....12	Single	Delco.....	H & A.....	Bijur.....	6	Bijur.....	6	Prest-O-L.....	110	6	1	S.....	G.....	10
Nelson.....		Bosch.....	Hand.....	U. S. L.....	12	U. S. L.....	12	Willard.....	72	12	2	S.....	G.....	12
Oakland.....34-B	Single		Hand.....	Remy.....	6	Remy.....	6	Prest-O-L.....	85	6	1	GI.....		
Oldsmobile.....45-B	Single	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Exide.....	80	6	1			
Olympian.....45	Single	Conn.....	Hand.....	A-L.....	6	A-L.....	6	U. S. L.....		6				
Overland.....90	Single	Conn.....	Hand.....	A-L.....	6-8	A-L.....	6	U. S. L.....	75	6-8		GI.....	Glass.....	6 20
Packard.....3-25	Single	Delco.....	H & A.....	Bijur.....	6	Bijur.....	6	Willard.....	120	6	1	S.....	G. T.....	6 10
Paige.....All	Single	At-Kent.....	Hand.....	Gray & Davis	6	Gray & Davis	6	Willard.....	108.4	6	1	S.....	G.....	20
Pan-American...6-48	Single	At-Kent.....	Hand.....	West.....	6	West.....	6	Willard.....	100	6	1	S.....	G.....	6
Paterson.....6-46	Dual	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Willard.....	110	6	1			
Peerless.....Ser. 4	Single	At-Kent.....	H & A.....	A-L.....	6	A-L.....	6	Willard.....		6	1			30
Pierce-Arrow. 311&511	Double	Delco.....	H & A.....	West.....	6-8	West.....	6	Willard.....	150	6	1	S.....	5 A. G.....	6-8 10
Pilot.....6-45	Dual	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Prest-O-L.....		6	1	GI.....		
Premier.....6-C	Single	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Willard.....	123.5	6	1	S.....		
Reo.....T & U	Single	Remy.....	Hand.....	Remy.....	6	Remy.....	6	Willard.....	108.5	6	2	GI.....	Wire.....	6 5
Revere.....	Single	Bosch.....	Hand.....	North East..	6	North East..	6	Willard.....	120	6	1	S.....		
Roamer.....6-54	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Columbia...	115	6	1	S.....	3A.....	6 10
Saxon.....Y-18	Single	Remy.....	Hand.....	Wagner.....	6	Wagner.....	6	Prest-O-L.....	60	6	1	S.....	Cart.....	6-8 15
Sayers.....	Single	Delco.....	Hand.....	Delco.....	6	Delco.....	6	Willard.....		6	1			
Scripps-Booth...Single	Single	Remy.....	Hand.....	Remy.....		Remy.....	6	Prest-O-L.....	80	6	1			
Seneca.....H	Single		Hand.....	Allis Chalm..	6			Willard.....	88	6	1	GM.....		20
Singer.....19	Single	Bosch.....	Hand.....	West.....	6	West.....	6	Willard.....	115	6	1	S.....	G. C.....	5a10
Standard.....8-H	Single	Dixie.....	Hand.....	West.....	6	West.....	6	Willard.....	162	6	1	S.....	2-A.....	15
Stanley.....735				Remy.....	6			Willard.....	100	6	1	G.....	Cart.....	6 20
Stearns.....SKL-4	Single	Remy.....	Hand.....	Remy.....	12	Remy.....	12	Willard.....	61.5	12	1	S.....		20
Stephens.....80	Single	Conn.....	Hand.....	A. L.....	6	A. L.....	6	U. S. L.....	116	6	1	S.....	Cart.....	6 20
Studebaker.....All	Single	Remy.....	Hand.....	Wagner.....	6-8	Wagner.....	6	Willard.....	115	6	1	S.....	Cart.....	6 10
Stutz.....G Double	Double		Hand.....	Remy.....	6	Remy.....	6	Willard.....		12	2			
Templar.....445	Single	Simms.....	Hand.....	Bijur.....	6	Bijur.....	6	Columbia...	100	6	1	S.....		6 20
Tulsa.....A-D-1	Single	Delco.....	Hand.....	Dyneto.....	6	Dyneto.....	6	Willard.....	90	6	1	S.....	G. T.....	6 15
Velie.....38	Single	Remy.....	Auto.....	Remy.....	6	Remy.....	6	Willard.....	105	6	1	S.....	Wire.....	6 5
Velie.....45	Single	At-Kent.....	S. A.....	Bijur.....	6	Bijur.....	6	Willard.....	120	6	1	S.....	Wire.....	6 15
Westcott...A-38&A-48	Single	Delco.....	H & A.....	Delco.....	6	Delco.....	6	Willard.....	117.7	6	1	S.....	C. B.....	
Willys-Knight...88-4	Single	Conn.....	Hand.....	A-L.....	6-8	A-L.....	6	U. S. L.....	120	6	2	GI.....	G. T.....	6 15
Winton Six.....24	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Willard.....	120	6		S.....	3A.....	6 15
Winton Six.....25	Single	Bosch.....	Hand.....	Bijur.....	6	Bijur.....	6	Willard.....	139	6	1	S.....	3A.....	6 15

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: At-K, Atwater-Kent; Conn., Connecticut; West, Westinghouse; Auto, Automatic; H & A, Hand and Automatic; S. A., Semi-Automatic. Generator: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; Ward-L, Ward-Leonard; West, Westinghouse; N. E., North East; Split, Splitdorf. Motor: A-L, Auto-Lite, G & D, Gray & Davis; Leece-N, Leece-Neville; West, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

Base Contact	LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model
	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single....	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.....	3/8	18	United....	Liberty.....10B
Double....	6-8	21	6-8	4	6-8	4	d6-8	2	A. C.....	3/8	18	Klaxon....	Locomobile....48-4-5
Single....	6-8	21	6-8	4	3-4	2	*3-4	2	Champion.	3/8	18	Schwarze..	Maibohm.....B
Single....	6-8	21	*6-8	9	6-8	4	6-8	4	A. C.....	3/8	18	Sparton...	Marmon.....34
Double....	12-16	21	*12-16	2	12-16	2	12-16	2	Champion.	3/8	18	Schwarze..	Maxwell.....25
Single....	6-8	21	*6-8	12	6-8	2	d6-8	2	A. C.....	3/8	18	Klaxon....	McFarlan.....27
Single....	6-8	21	*6-8	4	6-8	4	6-8	4	Champion.	3/8	18	Sparton...	Mercer.....Ser. 4
Single....	6-8	16	6-8	4	6-8	2	6-8	2	Champion.	3/8	18	Trojan....	Metz.....
Double....	6-8	15			s6-8	2	6-8	2	A. C.....	3/8	18	A. E. L....	Mitchell.....E-40
Single....	*6-8	15	d*6-8	4	d6-8	2	d6-8	4	A. C.....	3/8	18	Klaxon....	Moline Knight.....L
									Champion.	3/8	18	Klaxon....	Monitor.....
Single....	6-8	21			6-8	2	d6-8	2	Champion.	3/8	18	Trojan....	Moon.....All
Single....	6-8	20	6-8		6-8	2			Champion.	3/8	18	Garford...	Moore.....30
Single....	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.....	3/8	18	Stewart...	Nash.....
	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....	3/8	18	Sparton...	National.....6
	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....	3/8	18	Sparton...	National.....12
Double....	12-16	15	12-16	4	12-16	2	12-16	2				Nelson.....	
Single....	6-8	15			6-8	2	6-8	2	A. C.....	3/8	18	Klaxon....	Oakland.....34-B
Single....	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....	3/8	18	Optional..	Oldsmobile....45-B
									Champion.			E. A. Lab..	Olympian.....45
Single....	6-8	12			3-4	2	*3-4	2	Champion.	1/2		Auto-Lite..	Overland.....90
Single....	6-8	33	*6-8	4	6-8	2	6-8	2	A. C.....	3/8	18	Sparton...	Packard.....3-25
Single....	6-8	15	6-8	4	6-8	2	d6-8	2	A. C.....			Torjan....	Paige.....All
Single....	6-8	32			6-8	2	6-8	4	Champion.	3/8	18	E. A. Lab..	Pan-American....6-48
Single....	6-8	15	6-8	2	3-4	2	*3-4	2	A. C.....			E. A. Lab..	Paterson.....6-46
Single....	6-8	15	6-8	4	6-8	2	6-8	2	A. C.....			Sparton...	Peerless.....Ser. 4
Single....	6-8	21			6-8	5	6-8	5	A. C.....	3/8	18	Klaxon....	Pierce-Arrow...311&511
Single....	6-8	15			6-8	2	6-8	2	A. C.....	3/8	18	Schwarze..	Pilot.....6-45
Double....	6-8	21	*6-8	4	6-8	2	d6-8	2	A. C.....	3/8	18	Stewart...	Premier.....6-C
Double....	6-8	15			3-4	2	*3-4	2	A. C.....	3/8	18	Trojan....	Reo.....T & U
Double....	6-8	20	*6-8	8	6-8	4	6-8	4	Rajah.....	3/8		Klaxon....	Revere.....
Single....	6-8	15	*6-8	4	6-8	4	d6-8	4	Champion.	3/8	18	Sparton...	Roamer.....6-54
Single....	6-8	15			6-8	2	6-8	2	A. C.....	3/8	18	Schwarze..	Saxon.....Y-18
Single....	6-8	15			6-8	2	d6-8	2	Champion.			Stewart...	Sayers.....
Single....	6-8	15			6-8	2	6-8	2	A. C.....			Trojan....	Scripps-Booth....
									Klaxon....				
Single....	6-8	15	6-8	2	6-8	2	d6-8	2	A. C.....			Fitzgerald.	Seneca.....H
Single....	6-8	15		4	6-8	2	d6-8	2	A. C.....	3/8	18	Klaxon....	Singer.....19
Double....	6-8	18	*6-8	4	6-8	2	6-8	2	Splitdorf..	3/8	18	Klaxon....	Standard.....8-H
Double....	6-8	21	*6-8	4	6-8	2	6-8	2				Klaxon....	Stanley.....735
Single....	12-16	21	*12-16	4	12-16	2	12-16	2	A. C.....	3/8	18	B. & A. Lab	Stearns.....SKL-4
Single....	6-8	15	6-8	2	6-8	2	6-8	2	Champion.	3/8	18	Trojan....	Stephens.....80
Single....	6-8	21			6-8	2	6-8	2	Champion.	1/2		Sparton...	Studebaker....All
Double....	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.....			Klaxon....	Stutz.....G
Single....	6-8	21	*6-8	4	6-8	2	6-8	2	Champion.	3/8		Schwarze..	Templar.....445
Single....	6-8	21	6-8	2	6-8	2	d6-8	2	Champion.	3/8	18	Klaxon....	Tulsa.....A-D-1
Single....	6-8	21	*6-8	4	6-8	2	d6-8	2	Champion.	3/8	18	Sparton...	Velie.....38
Single....	6-8	15	6-8	4	6-8	4	d6-8	4	Champion.	3/8	18	Sparton...	Velie.....48
Single....	6-8	18	*6-8	4	3-4	2	d3-4	2	A. C.....	3/8	18	Klaxon....	Westcott....A-38&A-48
4 S-D2....	6-8	21	6-8	4	3-4	2	*3-4	2	Champion.	3/8	18	{ Klaxon... A. L.....	Willys-Knight....88-4
Single....	6-8	17	6-8	7	6-8	2	6-8	2	Champion.	3/8	18	American..	Winton Six.....24
Single....	6-8	17	6-8	7	6-8	2	6-8	2	Champion.	3/8	18	Electric...	Winton Six.....25

Battery: *Prest-O-Lite*, *Prest-O-Lite*. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor, Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.*, Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

Specifications of the Electrical Equipment That Is Found on 1919 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring-Sys-tem	Type of Elec-tric Sys-tem	FUSES		
	Sys-tem	Make	Control	Make	Volt age	Make	Volt age	Make	Amp. Hr.	Volt age			Type	Volts	Amp
Allen.....43	Single	Conn.	Hand	A-L.	6	A-L.	6	Prest-O-L.	90	6	1	GI.	GT.	5	15
American.....B	Single	At-Kent.	Hand	West.	6	West.	6	Columbia.	80	6	1	S.	3-A.	1.250	20
Anderson.....All	Single	Conn.	Hand	West.	6	West.	6	Willard.	90	6	1	S.	SAE.	6	5
Apperson.....All	Single	Remy.	Hand	Bijur.	6	Bijur.	6-8	Willard.	108	6	1	S.	Open.	1.250	10
Auburn.....6-39	Single	Remy.	Hand	Remy.	6	Remy.	6	Willard.	80	6	1	S.		6-8	25
Austin.....12	Single	Delco.		Delco.	6	Delco.	6	Willard.		6	1	S.	None.		
Biddle.....H	Single	Eisemann.	Hand	G & D.	6	G & D.	6	Willard.	90	6	1	S.	GT.	6	10
Bour-Davis.....20	Single	Remy.	Hand	Remy.	6	Remy.	6	Willard.	103	6	1	S.	GT.	6	15
Brewster.....	Single	U. S. L.	Hand	U. S. L.	12	U. S. L.	12				1				
Briscoe.....4-24	Single	Conn.	Hand	A-L.	6	A-L.	6	U. S. L.	80	6	1	GI.	GT.	6	15
Buick.....	Single	Delco.	Hand	Delco.	6	Delco.	6	U. S. L.	80	6	1	S.			
Cadillac.....57	Single	Delco.	Hand	Delco.	6	Delco.	6	Exide.		6					
Case.....U-19	Single	West.	Hand	West.	6	West.	6	Willard.	117½	6	1	GI.	3AGT.	50	15
Chalmers.....35C	Single	Remy.	Hand	West or A-L.	6	West or A-L.	6	Prest-O-L.	106		1	GI.		6	15
Champion.....KO	Single	Delco.	Hand	Dyneto.	6	Dyneto.	6	Willard.	90	6	1	S.	GT.	6	15
Chandler.....All	Single	Bosch.	Hand	West.	6	West.	6	Prest-O-L.	105	6	1	S.	Cart.	6	20
Chevrolet.....All	Single	Remy.	Hand	A-L.	6	A-L.	6	Willard.	80	6	1	GI.	GT.	6	20
Cleveland.....40	Single	G & D.	Hand	G & D.	6	G & D.	6	Prest-O-L.	94	6	1			6	20
Cole.....870	Dual	Delco.	H & A.	Delco.	6	Delco.	6	Prest-O-L.	50	6	1	S.			
Columbia.....All	Single	At-Kent.	Hand	A-L.	6	A-L.	6	Prest-O-L.	80	6	1	S.			
Comet.....6-53	Single	Wagner.	Hand	Wagner.	6	Wagner.	6	Willard.	75	6	1				
Crow-Elkhart.....K-36	Single	Conn.	Hand	Dyneto.	6	Dyneto.	6	Willard.		6				6	10
Cunningham.....V-3	Single	Delco.	Hand	West.	6	West.	6	Willard.	120		1				
Daniels.....8-B	Single	West.	Hand	West.	6	West.	6	Willard.	100		1	S.	GT.	5-8	15
Davis.....51	Single	Bosch.	Hand	Delco.	6	Delco.	6	Willard.	80	6	1	S.			
Dixie Flyer.....	Single	Conn.	Hand	Dyneto.	6	Dyneto.	6	Willard.	6-80		2				
Dodge.....	Single	H & A.		N. E.	12	North East.		Willard.	42	12	1	GM.	Encl.	1-50	10
Dorris.....	Single		Hand	West.	6	West.		Willard.	115	6	1	S.	GT.	5-8	15
Dort.....15	Single	Conn.	Hand	West.	6	West.	6	Willard.	85	6	1	S.		6	10
Elcar.....All	Single	At-Kent.	Hand	Dyneto.	7	Dyneto.	6	Willard.	90	6	1				
Elgin.....H	Single	Wagner.	Hand	Wagner.	6	Wagner.	6	Willard.	90	6	1		GT.	6-8	20
Essex.....A	Single	Delco.	H & A.	Delco.	7	Delco.	6	Exide.	105	6	1	S.			
Ford.....T*	Single	Own.	Hand	Own.		Own.		Exide.	80	6	1	S.			
Franklin.....9-B	Single	At-Kent.	Auto.	Dyneto.	12			Willard.	50	12	2	GM.	GT.	126	15
Geronimo.....		Delco.		Dyneto.	6	Dyneto.	6	Willard.	88	6	1	S.			
Glide.....6-40		West.		West.	6	West.	6	Willard.	80	6	1	GI.	Cart.	250	15
Hanson.....45-A		Remy.	Hand	A-L.	6	A-L.	6	Prest-O-L.	80	6	1			6	3
Harroun.....	Single	At-Kent.	Hand	Remy.	6	Remy.	6	Willard.	80	6	1				
Harvard.....4-20		At-Kent.		Wagner.	6	Wagner.	6	Nat. Carb.			1	S.			
Hatfield.....A		Conn.		Dyneto.	6	Dyneto.	6	Willard.	100	6	1	GI.			
Haynes.....All	Single	Remy.	Auto.	Leece-N.	6	Leece-N.	6	Willard.	120	6	2	GI.	C. B.		
Hollier.....All	Single	At-Kent.	Hand	Splitdorf.	6	Splitdorf.	12	Gould.	50	6	1	GM.			
Holmes.....	Single	Eisemann.	Auto.	Dyneto.	12			Columbia.	100	12	2	S.	2A.	15	15
Hudson Super-Six.....	Single	Delco.	H & A.	Delco.	7	Delco.	7	Exide.	100	6	1	GM.			
Hupmobile.....R	Single	At-Kent.	Hand	West.	6	West.	6	Willard.	87½	6	1	S.	Encl.	6	10
Jones.....	Single	Remy.	Hand	West.	6	West.	6	Prest-O-L.	120	6	1				
Kadan.....	Single	Delco.	H & A.	Bijur.	6	Bijur.	6	Willard.	109.8	6	1	S.	C. B.		
Kling.....EE-8	Single	At-Kent.	H & A.	Bijur.	6	Bijur.	6	Willard.	117.5	6	1				
Kissel.....	Single	Remy.	Hand	Remy.	6	Remy.	6	Willard.	90	6	1	S.	3 A. G.		20
Kline.....642-SS	Single	Conn.	Hand	West.	6	West.	6	Prest-O-L.	80	6	1	S.	5 A. G.	6	
Lexington.....R-19	Single	Conn.	Hand	West.	6	West.	6	Willard.	100	6	1	S.	G. T.	6	

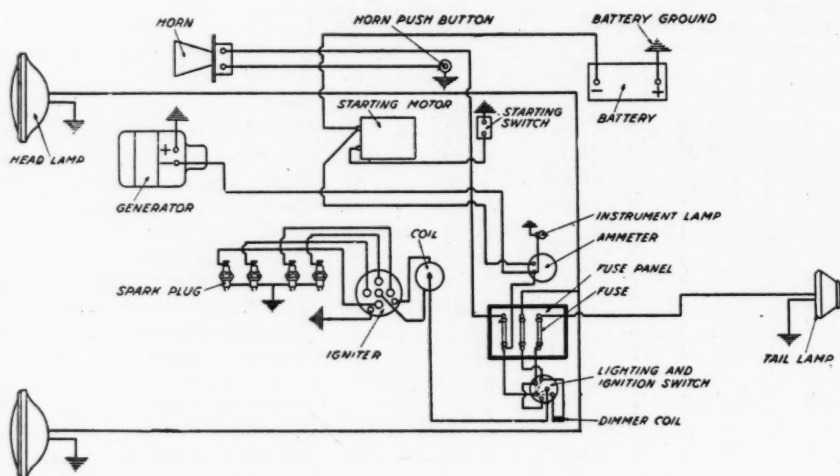
ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: At-K, Atwater-Kent; Conn., Connecticut; West, Westinghouse; Auto, Automatic; H & A, Hand and Automatic; S. A., Semi-Automatic. Generator: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; Ward-L, Ward-Leonard; West, Westinghouse; N. E., North East; Split, Splitdorf. Motor: A-L, Auto-Lite; G & D, Gray & Davis; Leece-N, Leece-Neville; West, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

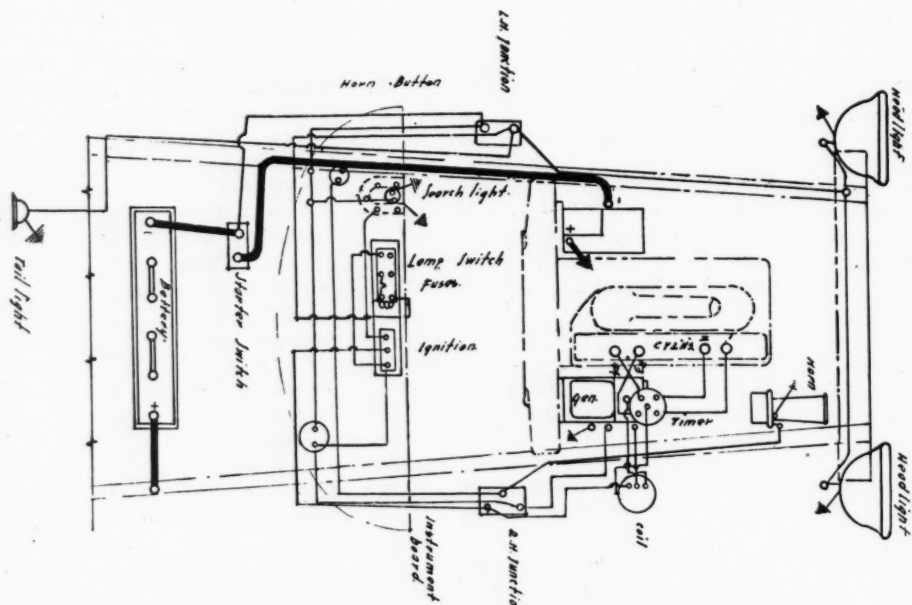
Base Contact	LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE								SPARK PLUGS			Horn	Make and Model
	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single...	6-8	15	*6-8	4	6-8	2	6-8	2	Champion.	7/8	18	Klaxon...	Allen.....43
Single...	6-8	15	*6-8	5	3-4	2	3-4	2	Champion.	7/8	18	Sparton...	American.....B
Single...	6-8	21	6-8	4	6-8	4	6-8	4	A. C.....	7/8	18	Klaxon...	Anderson.....All
Double...	6-8	15	*6-8	4	d6-8	2	d6-8	2	A. C.....	7/8	18	Sparton...	Apperson.....All
Single...	6-8	15	*6-8	4	6-8	2	6-8	2	Rajah.....	7/8	18	E. A.....	Auburn.....6-39
Single...	6-8	21	6-8	4	6-8	4	6-8	2	Reflex.....	7/8	18	Sparton...	Austin.....12
Single...	6-8	21	*6-8	4	6-8	2	d6-8	2	Splitdorf...	7/8	18	Klaxon...	Biddle.....H
Single...	6-8	15	6-8	5	6-8	2	6-8	2	A. C.....	7/8	18	E. A.....	Bour-Davis.....20
Single...	12	36	12	4	6-8	2	d6-8	2	Herz-Boug.	7/8	18	Klaxon...	Brewster.....
Single...	6-8	21			6-8	2	d6-8	2	Champion.	7/8		Schwarze..	Briscoe.....4-24
Single...	6-8	15	6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Stewart...	Buick.....
	6-8	21	6-8	4	3-4	2	3-4	2	Titan.....			Auto-horn.	Cadillac.....57
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.....	7/8		Klaxon...	Case.....U-19
Single...	6-8	21	6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Schwarze..	Chalmers.....35-C
Single...	6-8	15			6-8	2	6-8	2	Champion.	7/8	18	Garford...	Champion.....KO
Single...	6-8	18	6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Trojan....	Chandler.....All
Single...	6-8	21	6-8	4	6-8	2	d6-8	4	A. C.....	7/8	18	Klaxon...	Chevrolet.....All
Single...	6-8				6-8		6-8		A. C.....	7/8	18	Trojan....	Cleveland.....40
Single...	6-8	21	*6-8	5	6-8	2	d6-8	5	A. C.....	7/8	18	Sparton....	Cole.....870
Single...	6-8	15	*6-8	4	6-8	2	d6-8	2	Champion.	7/8	18	Schwarze..	Columbia.....All
Single...	6-8	18			6-8	2	6-8	4	Champion.	7/8	18	Klaxon....	Comet.....C-53
Single...	6-8	15	6-8	4	6-8	2	6-8	2	Champion.	7/8		E. A. Lab..	Crow-Elkhart...K-36
Single...	6-8	21	6-8	4	6-8	2	6-8	2	Champion.			Sparton....	Cunningham....V-3
Single...	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.....	5/8	18	Klaxon...	Daniels.....8-B
Single...	6-8	21			6-8	2	6-8	2	A. C.....	7/8	18	Klaxon....	Davis.....51
Double...	6-8	15			d3-4	2	d3-4	2	Champion.			Garford...	Dixie Flyer.....
Single...	12-18	15			12-18	2	12-18	2	A. C.....	7/8	18	Klaxon...	Dodge.....
Single...	6-8	21	*6-8	4	6-8	2	6-8	2	Champion.	7/8	18	Klaxon...	Dorris.....
									A. C.....				
Single...	6-8	15			6-8	2	d6-8	2	A. C.....	7/8	18	Schwarze..	Dort.....15
Single...	6-8	15	6-8	4	6-8	2	6-8	2	Champion.			Klaxon....	Elcar.....All
Single...	6-8	21			6-8	2	6-8	2	Champion.	7/8	18	E. A. L....	Elgin.....H
Single...	6-8	15			3-4	2	*3-4	2	A. C.....	18 m.m.	1.5 m.m.	Sparton....	Essex.....A
Single...	6-8	21	6-8	2	6-8	2			Champion.	1/2	pipe	Own.....	Ford.....T
Double...	12-16	21	*12-16	4	6-8	2	6-8	2	Splitdorf...	7/8	18	Klaxon....	Franklin.....9-B
									Benton....				
Single...	6-8	21			6-8	2	6-8	2	Champion.	7/8	18	Trojan....	Geronimo.....
Single...	6-8	15	*6-8	4	d6-8	2	d6-8	2	Champion.	7/8	18	Klaxon...	Glide.....6-40
	6-8	15			6-8	2	6-8	2	Champion.	7/8	18	Schwarze..	Hanson.....45-A
Single...	6-8	15			3-4	2	d3-4	2	A. C.....			Schwarze..	Harroun.....
	6-8		3-4		3-4		*3-4			7/8	18		Harvard.....4-20
Single...	6-8	15	*4-8	4	6-8	4	6-8	2	A. C.....	7/8	18	Ecco.....	Hatfield.....A
Double...	6-8	15	*6-8	12	d6-8	2	6-8	2	A. C.....	7/8	18	Klaxon...	Haynes.....All
Single...	6-8	15			6-8	2	6-8	2	Champion.	7/8	18	Sparton....	Hollier.....All
Double...	12-18	30	*12-16	4	6-8	2	6-8	2	Bethlehem	7/8	18	Klaxon...	Holmes.....
Single...	6-8	15	6-8	4	3-4	2	*3-4	2	A. C.....	7/8	18	Sparton....	Hudson Super Six.....
Single...	6-8	15	6-8	2	6-8	2	6-8	2	A. C.....	7/8	18	Trojan....	Hupmobile.....R
Double...	6-8	15	*6-8	4	s6-8	2	s6-8	2	Champion.	7/8	18	Newtone..	Jones.....
Single...	6-8	18	*6-8	4	6-8	2	6-8	2	A. C.....	7/8	18	Sparton....	Jordan.....
Single...	6-8	21	*6-8	4	6-8	2	6-8	2	Champion.	7/8	18	E. A. L....	King.....EE-8
Double...	6-8	18			d6-8	2	d6-8	2	A. C.....	7/8	18	Sparton....	Kissel.....
Single...	6-8	15			6-8	2	d6-8	2	Champion.	7/8	18	Klaxon...	Kline.....642 S. 8
Single...	6-8	21	*6-8	4	6-8	2	d6-8	2	Champion.	7/8	18	Klaxon...	Lexington.....R-19
									Bethlehem				

Battery: *Prest-O-Lite*, *Prest-O-Lite*. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor, Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.* Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

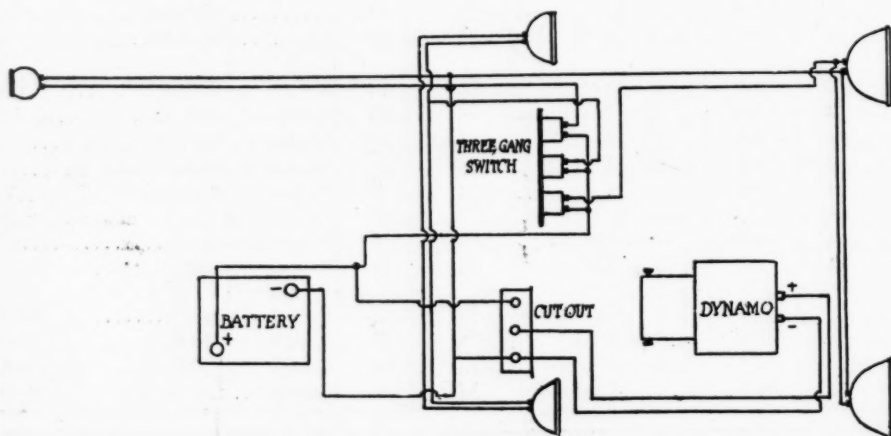
Motor Age Weekly Wiring Chart No. 49



1917 and 1918 Hupmobile, Model R, with Westinghouse system.



Wiring of 1917 and 1918 Briscoe with Splitdorf-Aplco system.



Wiring diagram of Delco system on 1913 Oakland, Model 42

THIS WEEK

Hupmobile, 1917 and 1918

Briscoe, 1917 and 1918

Oakland, 1913

HERE ARE THOSE THAT HAVE APPEARED

- Abbott—March 27
- Alco—April 24
- Alter—Nov. 4
- Apperson—March 6
- Buick—Nov. 21-April 3
- Cadillac—Dec. 9
- Cartercar—May 1
- Case—Feb. 27-Oct. 2
- Chalmers—Feb. 20-March 27
- Chandler—April 3
- Chevrolet—Nov. 28-March 27
- Cole—Jan. 23-April 3
- Crow-Elkhart—June 28
- Davis—May 8
- Detroit—March 6
- Dodge—Dec. 12
- Dort—March 13
- Elgin—Feb. 27
- Empire—March 18
- Ford—Jan. 30-Feb. 6-May 15, 22
- Franklin—June 19
- Grant—Feb. 28-March 27
- Haynes—Oct. 9
- Henderson—April 3
- Hudson—Dec. 5-May 1
- Hupmobile—Feb. 13
- King—July 3
- Krit—Feb. 6
- Lexington—April 24
- Little—March 20
- Locomotive—Jan. 23-April 17
- Maxwell—Jan. 16-Aug. 14
- Marion—March 6-20
- Mercer—Jan. 23-Aug. 28
- Michigan—March 20
- Mitchell—Jan. 9
- Murray—May 1
- National—June 19
- Oakland—Jan. 2
- Overland—Nov. 7-14
- Owen-Magnetic—Sept. 8
- Packard—June 19-July 31
- Paige—July 3
- Paterson—July 3
- Paterson—Mar. 20-June 20
- Pierce-Arrow—Oct. 2
- Premier—April 10
- Pullman—April 10
- Regal—Feb. 6-April 10
- Reo—Feb. 27-Aug. 31-Oct. 9
- Saxon—April 17
- ScrippsBooth—Dec. 26
- Simplex—April 17
- Stanley—June 20
- Stearns-Knight—April 24
- Studebaker—Dec. 26
- Stutz—Jan. 23
- Velle—April 24-Sept. 25
- Special Systems for Fords—May 15-22
- General Battery Charging—May 29
- General Battery Charging—May 29-Sept. 25
- General Magneto Diagrams—June 5
- Internal Connections—July 10-17-24

The Accessory Corner

New Fitments for the Car

METER RECORDS HILL GRADES

The Hillmeter not only satisfies the curiosity of the driver or passenger when it automatically registers the per cent grade of all hills but completes such

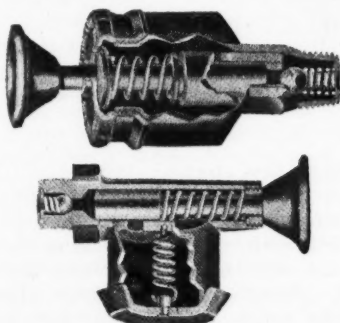


Meter for Hill Grades.

data upon which a driver relies to judge his engine's performance. It takes only a screwdriver to attach it to the interior of the car. The Hillmeter is distributed by the Meteor Sales Co., New York.

OIL-KIPPS

This name has been given to a new type of oil cup intended to replace the present grease cup as far as possible for better chassis lubrication. Grease cannot lubricate parts which do not revolve and oil cups are not always effective. In the Oil-Kipps cup the oil is applied with an oil can. The spring

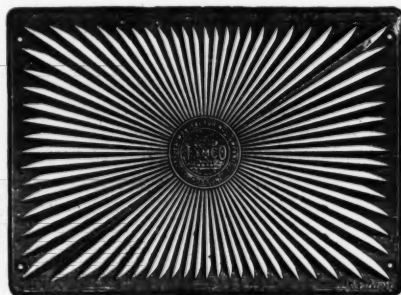


Oil Kipps.

plunger is pulled up and then allowed to snap back into position. One filling of the cups is said to be sufficient for two or more weeks and it is only necessary to snap the cups once each day or so to insure good lubrication. Oil-Kipps come in both horizontal and vertical types, so they can be fitted to practically any part of the chassis. They are made by the Madison-Kipp Corp., Madison, Wis.

TYLER SAFETY STEP PLATE

A foot plate on the running board is practical as well as adding to a car's looks. By providing a sure footing, the danger of injury from slipping is reduced. Further, a foot plate helps to keep the interior of the car clean and prevents the running board linoleum from wearing out in one spot. The Tyler step plates shown in the illustration

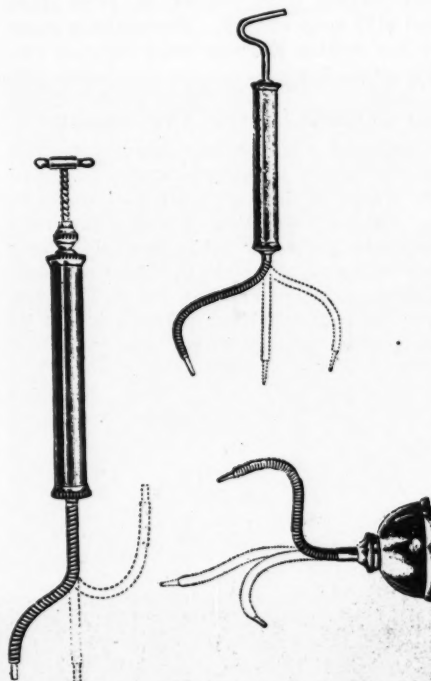


Tyler Safety Step Plate.

are made by the Tyler Mfg. Co., Boston, Mass. They are constructed of aluminum and red rubber treads are inserted for the safety grip.

ALL-WAY OILERS

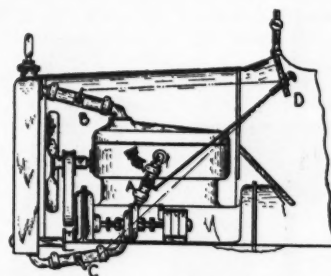
These oilers are fitted with flexible spouts, made to be bent in any direction without breaking or interfering with the flow of oil as the spout may be bent to the spot where the oil is to be introduced. The oilers are fitted with a cleaning device at the end of the spout and the same device prevents an excessive flow of oil. Copper-plated steel is used in making them and they come in various sizes, as follows: 1/3 pt., 1/2 pt., 1 pt. and a 9-in. oil gun. The prices of these range from 75 cts. to \$1.50. There is also a combination oil and grease gun for \$3.50.



All-Way Oilers

TEMPERATURE CONTROL

Automatic control of engine temperature is possible by the installation of a device which permits the engine to reach a temperature of 150 deg. in 2 min. after starting, because only the water within the engine jackets has to be heated. It can be regulated from the seat by a rod, D, to any desired tem-

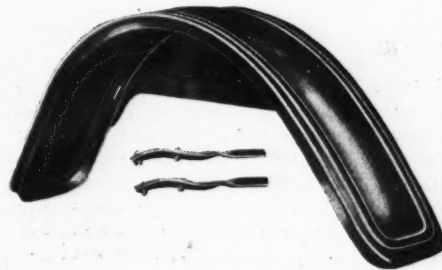


Automatic Temperature Control.

perature, regardless of atmospheric conditions. It is especially desirable to use a motometer in conjunction. Its installation is easy; the regulator can be placed in the hose pipes at A, B, or C, the rod D leading to the instrument board. The price complete is \$5. The instrument is made by the Automotive Devices Co., Detroit.

CROWN FORD TRUCK FENDERS

The rear wheels of Ford trucks are not regularly equipped with fenders, hence a market is presented for the sale of the rear wheel crown fenders made by the Corcoran Mfg. Co., Cincinnati,



Crown Ford Truck Fenders

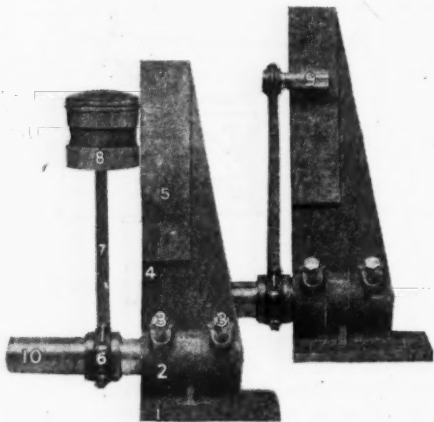
Ohio. Several size fenders are made for the Ford truck. One size is for trucks with solid tires and another for those using pneumatic tires. The fenders are shipped with all the parts necessary to fit them to the truck frame. The No. 5 fender, which is the type shown in the illustration, lists at \$7.50 a pair.

Service Equipment

Time Savers of the Shop

PEYER PISTON AND BEARING JIG

This jig makes it possible to do connecting rod and bearing work at the bench with the certainty of having the piston and rod lined up with the cylinder. It therefore does away with eight or ten fittings while lying on one's back on the floor. In the illustration 1 is the foot of the stand, 2 the body, with $1\frac{1}{2}$ in. hole for arbors, 3, set screws to hold

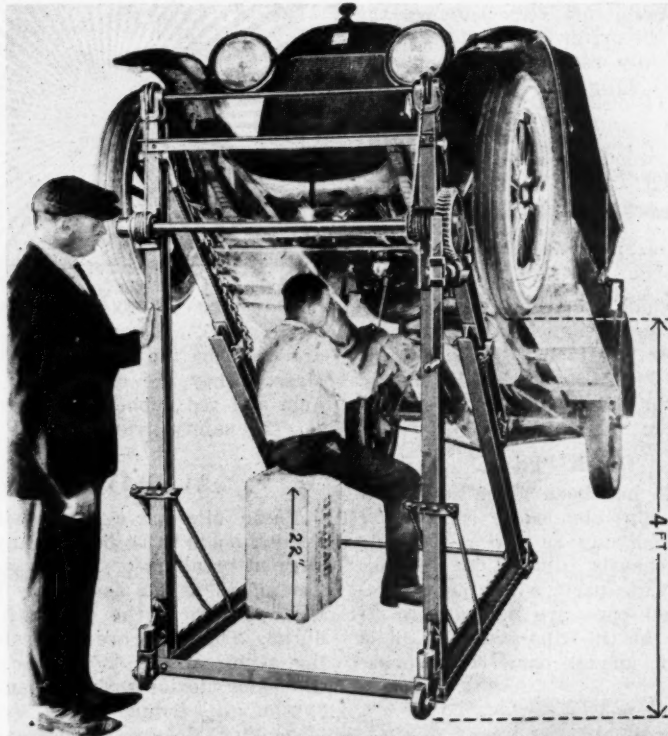


Peyer piston and bearing jig

arbors, 4, front surface perfectly square with axis of arbor, 5, surface used for testing if connecting rod is twisted and is perfectly parallel with axis of shaft, 6, connecting rod with bearing, 7, connecting rod stem, 8, piston, 9, wristpin in position for aligning, 10, arbor .002 in. under standard crankshaft size. The selection of the arbor size is left to the customer. The price of the jig is \$24.50, and it is made by John Peyer, 301 West Sixty-eighth street, New York.

PERKINS ELECTRIC DOOR CONTROL

The Perkins electric door control makes it possible to open and close doors by simply pushing a button. Usually the button can be placed at the desk of one of the office employees, who can then operate the door as occasion demands. Power is taken from an electric light socket and ordinary bell cord or telephone wire can be used for the connections. The mechanism includes a 1-6 hp. motor, magnetic switch, main driveshaft reducing gear and one pulley. All of these are mounted on one base and applied to the door. It is stated that a pair of swinging doors can be opened in 7 sec. The outfit is also applicable to rolling doors. One of the advantages claimed is that the doors close easily and quickly and as both close at the same time there is fuel conservation in cold weather. The price for



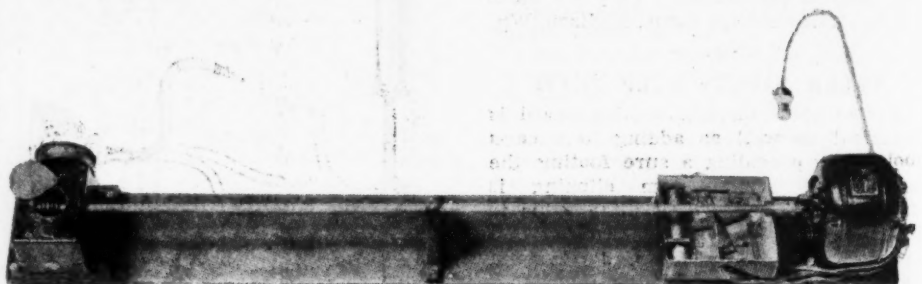
Klemme hoist and crane in operation, showing how it makes repair work easier

the swinging door single rolling door and double door outfits is \$170, \$165 and \$175 respectively. The outfit is made by the Perkins Electric Door Control Co., Waterloo, Iowa.

KLEMME HOIST AND CRANE

With the Klemme hoist an engine can be overhauled without being taken out of the frame of the car, main and connecting rods can be adjusted and other work underneath the car performed. It allows the workman to get at the job in a comfortable position and the job to be properly lighted up. Rear axle work can be performed, or the front wheels raised

to adjust the steering gear, etc. The hoist is tested to 13,000 lb. and thus will take any make or weight of car. It is provided with a safety locking device so a car can be locked at any desired height. There is also a crane attachment, by which an engine or any other part can be taken from a car and carried to any part of the shop, as the hoist is portable. The crane has a lifting capacity of 3000 lbs. No chain hoist is included in the price. The lifting height of the hoist for the average car is from 48 to 53 in. The price of the outfit is \$175. It is made by the A. C. Klemme Mfg. Co., Davenport, Iowa.



Perkins electric door control

Among the Makers and Dealers

Short Trade Notes

Briscoe to Enlarge Plant—The Briscoe Motor Corp. plans the extension of its manufacturing capacity, and has sold 45,000 shares of new common stock to secure the necessary funds. Production is now running at 1500 cars a month.

Brown of Perfection Spring Dies—Ralph Brown, sales engineer for the Perfection spring division of the Standard Parts Co., Cleveland, Ohio, died of pneumonia on Sept. 22. He was 32 years old and was with the Standard Parts Co. since 1915.

New Stephens and Columbia Dealer—H. A. Swan, Danville, Ill., has organized the Triple S Motor Car Co., 109 W. Main street. The company will be distributor for the Stephens and Columbia cars and later may take on a line of trucks and tractors.

Grant Insures Employees—The Grant Motor Car Corp. has just insured all employees of the Cleveland plant, the total of policies issued being about \$500,000. The plan, when completed, will provide protection for every member of the Grant organization.

Canadian Agent for Roller-Smith—The Alfred Collyer Co., Montreal, has been appointed agent for the Roller-Smith Co., for the Dominion of Canada and Newfoundland. The latter concern will be represented in Florida, Georgia, Alabama and Tennessee by the General Machinery Co., Birmingham, Ala.

Haskell Now With Grant—J. A. Haskell, formerly of Chicago and Des Moines, Ia., and for some time connected with the sales department of the Grant Motor Car Corp., Cleveland, has been made assistant to George S. Waite, general sales manager of the Grant Corp. Before joining Grant Mr. Haskell was assistant branch manager for the Studebaker Corp., Chicago, and later branch manager for the same organization in Des Moines.

Porter Timken Sales Manager—H. J. Porter, who has been connected with the sales department of the Timken Roller Bearing Co. for the past 8 years, has been made sales manager, with headquarters at the general offices of the company at Canton. J. R. Comber, who has been with the Timken Roller Bearing Co., Canton, O., for 7 years, has been moved from the position as head of the sales-order division to field work in connection with the tractor and farm implement division.

Steinhart Erecting New Building—Work was started Oct. 1 on the new building of the E. W. Steinhart Terre Haute Co., Terre Haute, Ind., Cadillac and Dodge Bros. dealers. The building will be three stories, of white brick and terra cotta, 80 by 140 ft., and will cost approximately \$125,000. The plant will employ from 80 to 100 men, will include showrooms, accessory rooms, stock rooms, body and top work room, tire repair department, offices, painting department and machine shops. The building here will be the largest branch of the main office in Indianapolis and in general style will be an exact replica of the Indianapolis plant. The local organization is

independent of the Indianapolis company, having its own organization with J. E. Ullom, vice-president and general manager, and A. E. Kress, assistant manager.

Open Vulcanizing Shop—McAneny & Conrad, Milwaukee, is a new partnership which has opened a tire store and vulcanizing shop at 465 Jefferson street.

White to Have New Service Plant—The White Company of Cleveland has purchased a lot in Atlanta, Ga., for \$35,000, on which it will erect a modern service station and parts depot for the southeastern territory.

New Tire Firm for Cleveland—The Ultimate Tire & Rubber Co., capitalized at \$2,000,000, will establish its plant in Cleveland. The first unit will cost \$250,000. R. J. Birch, president of the new concern, has taken a 99-year lease on a manufacturing site, with an option to purchase by July, 1929, at \$120,000.

Overland Men Meet—Following meetings at Hannibal, Mo.; Quincy, Ill., and Paducah, Ky., an Overland dealers' convention was held in St. Louis under the auspices of the Overland Automobile Co. of St. Louis. All of the meetings were presided over by H. R. Henry, wholesale sales manager. Some of the dealers drove away demonstrators of the new Overland Four.

Parts Maker Enlarges Plant—The A. O. Smith Corp., Milwaukee, one of the largest manufacturers of automotive parts, is starting enlargement of its works at a cost of more than \$4,000,000, to increase the capacity approximately 100 per cent. The additions will provide a total of 400,000 sq. ft. of floorspace. The present working force of more than 2500 operatives will be increased in groups to 5000 or more. About 400 men are now being added as rapidly as competent help becomes available.

New Building for Philadelphia Dealer—A one-story brick motor car sales and service station will be erected by Charles Kahn, Philadelphia, at a cost of \$7,000.

Manager of Tire Department—The McCoy-Nolan Supply Co., 509 East Water street, Milwaukee, a new Federal Tire dealer, has appointed Edward M. Dieringer as manager of the tire and supply department.

New Milwaukee Dealers—The Murray Sales Co., Milwaukee, is a new corporation organized with \$10,000 capital by Edward F. Murray, Frank L. Abraham and William Straub, to deal in motor cars, machinery, etc.

The present organization for the Brown Auto Carriage Co. will remain in control with P. J. Brown, president; W. G. Schmunk, vice-president, and Carl Halle, treasurer. The superior avenue plant of the concern will be converted into a service station on body repairs and wheel work.

To Represent Hudson Co.—Hugson & Morton, Inc., manufacturers sales representatives, having offices in San Francisco, Cal., Los Angeles, Cal., Portland, Ore., and Denver, Colo., has entered into an arrangement to represent the Hudson Motor Specialties Co. in Washington, California, Wyoming, Nevada, Colorado, New Mexico, Oregon, Idaho, Utah and Arizona.

New Body Firm is Organized—The Brown Auto Carriage Co. has been reorganized into the Brown Body Corp., with a capitalization of \$1,000,000, for the exclusive manufacture of motor car bodies, specializing in the Cleveland trade. A 3½-acre factory site has been purchased and work will start immediately upon the first unit of a plant to cost approximately \$500,000, the units to contain a total floor space of 200,000 sq. ft.



THE OLDEST AND THE YOUNGEST
"Uncle John" Fhell of Leslie County, Kentucky, is 113 years old and has adopted a new Overland Four for his travelling.

From the Four Winds

Glimpses at the World of Motordom

Use Farm Lights For Threshing—A big field for farm lighting outfit dealers is disclosed by the situation among Nebraska farmers this fall. On account of the shortage of labor and the big crop, farmers have been unable to accomplish all their work in daylight hours and have resorted to night threshing. In order to get enough light for this work, farm lighting outfits are used.

Club Elects Officers—The Richland County (Ohio) Automobile Club at its annual election recently elected the following to guide the club for the coming year: Charles E. Ozier, president, and Frank Beverstock, secretary. The new president served as treasurer of the club under the presidency of E. F. Wickwire. The executive committee consists of L. C. Chase, Edwin D. Ford and James Bailey.

Names Good Roads Committee—President J. K. Wadsworth of the Warren Automobile Club has named the committees on highways and roads, streets, signs, grievance and press for the coming year. E. L. Houser of Girard is chairman of the highway and roads committee; R. S. Harrell, chairman of the streets committee; E. A. Osborne, chairman of the signs committee, and F. E. Bentley, chairman of the grievance committee.

Boise Has Motor Camp—A tourist camp, furnished with electrical stoves and a bath house, has been installed by citizens of Boise, Idaho, at the edge of town on the banks of the Boise river. More than 15,000 motorists have made use of the camp since the first unit was installed in June, 1918. The bathhouse was completed and dedicated September 19, with appropriate ceremonies participated in by business

Coming Motor Events

TRACTOR DEMONSTRATIONS

Houston, Tex.	Rice Tractor Exhibition	Nov. 11-13
Ottawa, Ontario	Tractor and Farm Machinery	Oct. 14-16

RACES

Los Angeles, Cal.	Ascot Speedway	Nov. 27
Los Angeles, Cal.	Ascot Speedway	Dec. 20

SHOWS

Boston	Boston Automobile Show	March 13-20
Chicago	Automotive Equipment Association	Nov. 3-8
New York	N. A. C. C.	Jan. 3-10
Chicago	N. A. C. C.	Jan. 24-31
Kansas City, Mo.	Kansas City Tractor Club	Feb. 9-14
Wichita, Kan.	Wichita Thresher-Tractor Club	Feb. 9-11
Detroit	N. A. C. C. Service Meeting	November
Montreal, Que.	Dealers' Show	February
Atlanta, Ga.	Atlanta Show	Oct. 11-21

men workers, who co-operated in its construction, and by a large party of tourists at the camp. A tender is in charge of the camp, and keeps a register of all visitors.

Food Commissioner to Promote Rural Express—Dr. Eugene H. Porter, New York state commissioner of foods and markets, has started a survey of the existing rural motor express routes in the state with a view of extending them for the transportation of food supplies. Dr. Porter declares that the present express routes have proved efficient and economical in

bringing food from the farms to the consumers, but he believes that an extension and improvement of the service can readily be effected.

Object to Labeling Cars—Bankers and jewelers have objected to the enforcement of the new St. Louis city ordinance which provides that all vehicles used for commercial purposes bear the names and addresses of the owners in letters, pointing out that such labeling would call attention of prospective highwaymen to the contents of the vehicles, which often are of great value. An amendment will be offered providing that the chief of police may name certain exceptions to the rule.

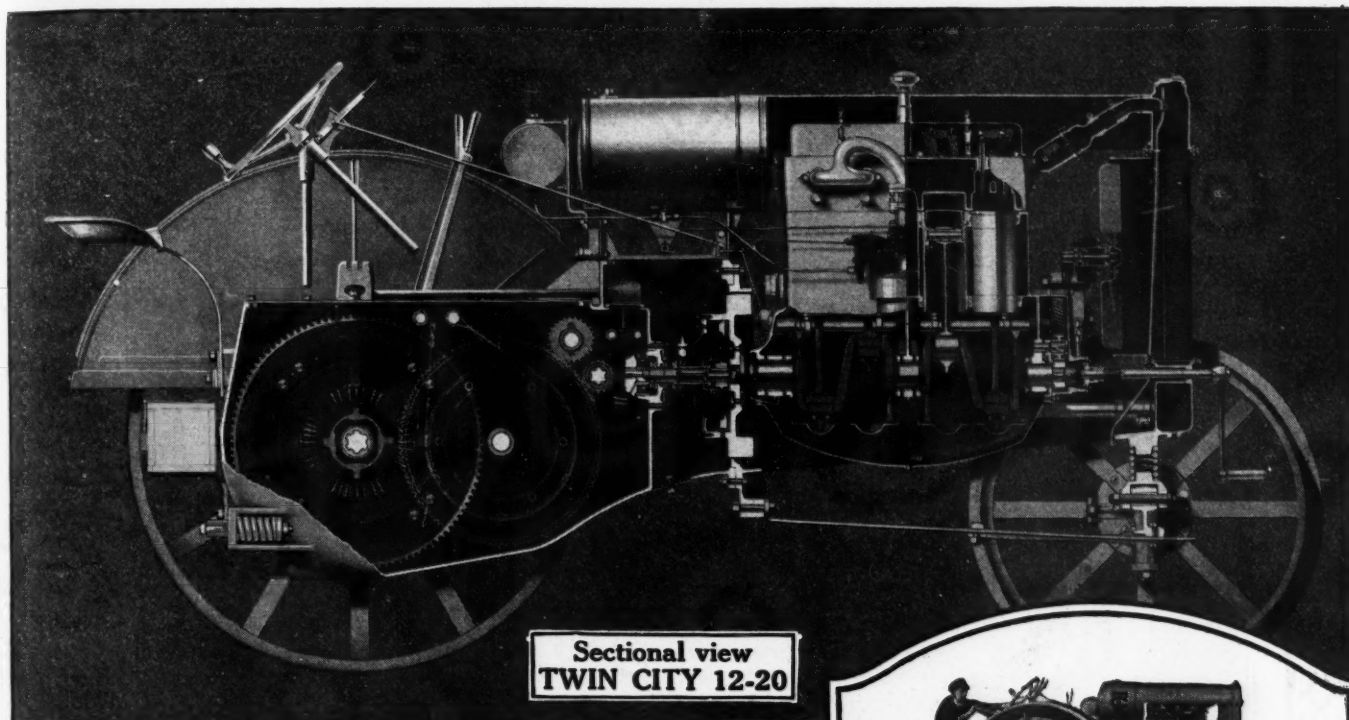
Motor Society Is Organized—The Henry County Automobile association was recently organized at a meeting attended by owners and dealers from every part of the county. Headquarters have been opened in the First National Bank Bldg., Napoleon, Ohio. Officers elected are: Fred Gribbell, Deshler, president; R. W. Austermiller, Holgate, vice president; John F. Cuff, Napoleon, secretary-treasurer. Others on the board of trustees are W. G. McClure, Napoleon; A. Z. Bryan Jr., Liberty Center.

Campaign Posters Get the Gate—Politicians will no longer be permitted to use the highways of New York state to boost their candidates. State Highway Commissioner F. S. Greene has just issued a ruling forbidding the erection of political signs along the highways and on state property. He has ordered all such signs already placed removed, declaring the state property shall be limited as far as signs go to markers giving directions and telling distances to points reached by the highway. His crusade against political signs was the result of the wholesale disfiguring of the highways of the state with glaring posters booming various candidates, especially in upper and western New York.



Champion Racing Car of South America

This illustration shows what is believed to be the fastest race car in South America. It is owned by Danree & Cia, agents for the Dodge Brothers and Packard cars. The chassis is stock all the way through, but the body was made by a concern in Montevideo.



Sectional view
TWIN CITY 12-20

The Inside Facts of the Twin City 12-20

—All Selling Advantages for You

EVERY refinement that makes for endurance, dependability and power is included in this tractor. Here are a few of the reasons for its unapproached quality:

A 16-valve four-cylinder engine, valve-in-head type, developed by our own engineers in our own great plant to provide power far above its rating.

It is designed, not adapted, for kerosene. Removable cylinder heads and sleeves; counterbalanced crankshaft.

Accessible, smooth-running, clean-burning, there is nothing like it in the tractor field today.

Transmission completely enclosed, running in an oil bath. One-piece rigid frame. Steel cut gear teeth. Direct drive on both forward speeds. Semi-floating axle.

A sealed Pierce governor control, holding the engine to a steady speed of 1,000 r. p. m.; large Spirex radiator core with thermostatic control of water

cooling; Bosch high tension magneto with impulse starter; Borg & Beck clutch; Bennett air cleaner; TWIN CITY-Holley kerosene carburetion system. In short—

**Built to Do the Work—
Not to Meet a Price**

The TWIN CITY dealer, selling this tried and proven product, has the backing of an immense organization, the co-operation of a live sales force, a complete dealer service, and the support of an intensive advertising campaign.

TWIN CITY All-Steel Threshers are built for lifetime service. They are grain-savers and time-savers, designed from years of practical experience in the field.

Write for full information regarding territory, discounts, etc.

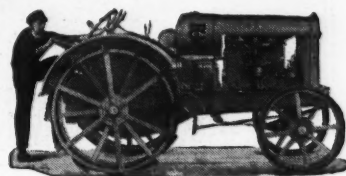
Minneapolis Steel & Machinery Company, Minneapolis, U. S. A.

BRANCHES AND DISTRIBUTORS

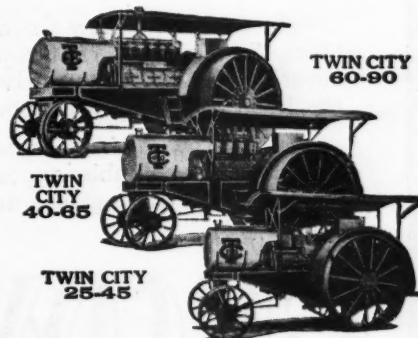
Minneapolis Steel & Machinery Co.—Denver, Colo.; Des Moines, Ia.; Peoria, Ill.; Fargo, N. D.; Great Falls, Mont.; Wichita, Kan.; Salt Lake City, Utah; Spokane, Wash.
Twin City Co.—Indianapolis, Ind.; Lincoln, Neb.; St. Louis, Mo.; Crowley, La.; Dallas, Houston, Amarillo and San Antonio, Texas.

Eastern and Export Offices—Minneapolis Steel & Machinery Co.; 154 Nassau St., New York City.
Minneapolis Steel & Machinery Co. of Canada, Ltd.—Winnipeg, Man.; Calgary, Alberta; Regina, Sask.
Frank O. Renstrom Co.—San Francisco, Oakland, Stockton and Los Angeles, Cal.
Baskerville & Dahl—Watertown, S. D.

TWIN CITY
Power Farming Equipment



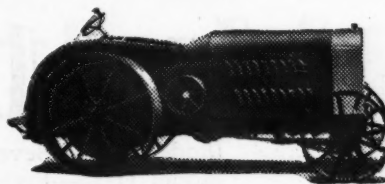
TWIN CITY 12-20



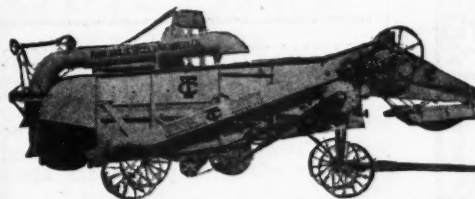
TWIN CITY
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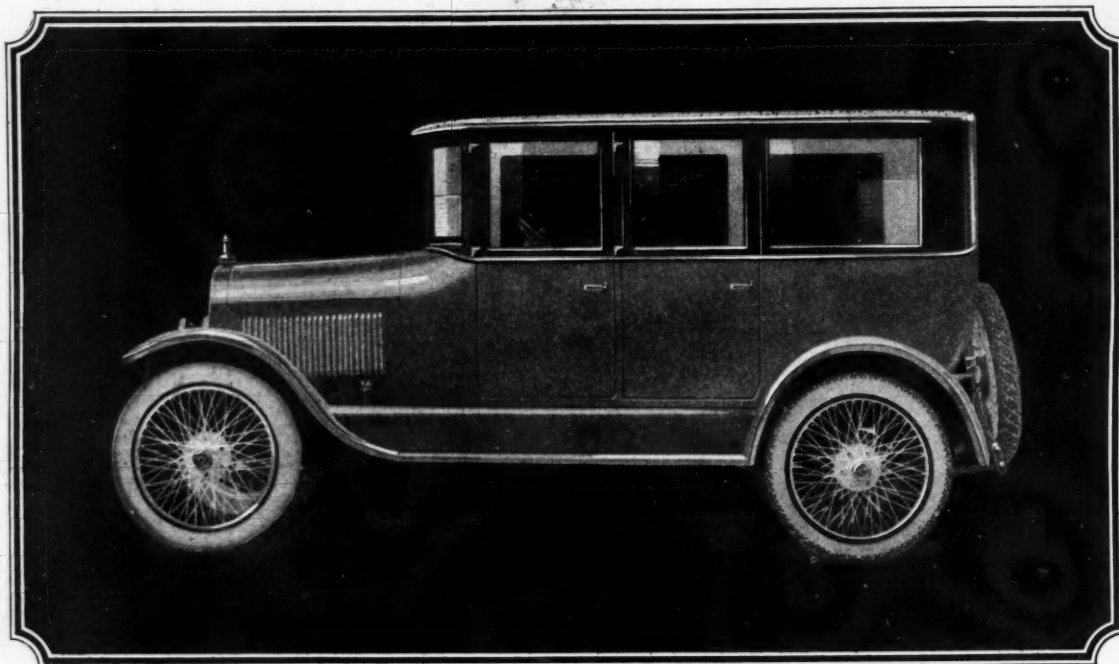
TWIN CITY
25-45



TWIN CITY 16-30



TWIN CITY All-Steel Thresher



In Design

In design the new Crow-Elkhart sedan possesses a zest and freshness most desirable. The straight, flat top, square doors, and wide windows lend a note of smart severity; the V-shaped driver's compartment is especially unique. The slim lines of the hood and body are unbroken; the fenders are full-crown and molded.

The Crow-Elkhart sedan's unusual design and sturdy construction make its representation a profitable opportunity for any motor car merchant of high standing. The country-wide waiting lists on the Crow-Elkhart open and inclosed models indicates the demand.

CROW-ELKHART Multi-Powered

Model H-57—Seven Passenger Sedan, Six Cylinder.....	\$2395
Model H-55—Five Passenger Touring Car, Six Cylinder.....	\$1545
Model L-55—Five passenger Touring Car, Four Cylinder.....	\$1295

WRITE FOR CATALOG CONTAINING FULL INFORMATION

CROW-ELKHART MOTOR CORPORATION, Dept. 101, ELKHART, INDIANA
Export Department, Broadway at 53rd St., New York City, U. S. A.

DEALERS will instantly recognize the unusual profit-proposition that the representation of the Crow-Elkhart Multi-Powered Line affords. Desirable territory is still available. Write today, or wire, for particulars about our unusually attractive dealer franchise.

MICHELIN

AN OPPORTUNITY

Notwithstanding the popularity of Michelin Tires, there are some towns where dealers can still secure this valuable account.

In these towns we offer the following:

1st—A thoroughly tested cord tire, made by the oldest pneumatic tire maker in the world.

2nd—A fabric tire of unsurpassed quality sold at a moderate price.

3rd—The only ring-shaped tube on the market—a tube that sells itself.

4th—One of the biggest and most impressive tire and tube advertising campaigns ever conducted.


5th—Special sales helps for individual dealers.



We invite you to write us now.

MICHELIN TIRE COMPANY

Milltown, New Jersey



THE greater beauty and smartness which Hayes Wire Wheels give to any car are almost universally recognized. But their superior strength over other types is not so widely known. You have probably noticed that racing cars are all equipped with wire wheels nowadays. Drivers like Oldfield, DePalma, Mulford and Rickenbacker, insist on wire wheels. Because most wheel breakages come from skidding, or thrust blows. In such circumstances, Hayes Wire Wheels have nearly twice the strength of old-fashioned wheels. You may prefer Hayes Wire Wheels for their added style, but you should not overlook their greater safety. A dozen spokes, or more, can be removed from a Hayes Wire Wheel without interfering with its functions. The fact that wire wheels are much more quickly and easily changed in case of tire trouble is also an important factor. Racing men lack your appreciation of the *beauty* of Hayes Wire Wheels, but they do value immeasurably the convenience of changing a tire with one-eighth as many operations as a demountable rim requires. Your own motor car dealer, or the Hayes sales and service station in your locality, will supply Hayes Wire Wheels for your car in any color.

DEALERS: If there is no sales and service station for Hayes Wire Wheels in your vicinity, write us at once for our exceptional dealer proposition.

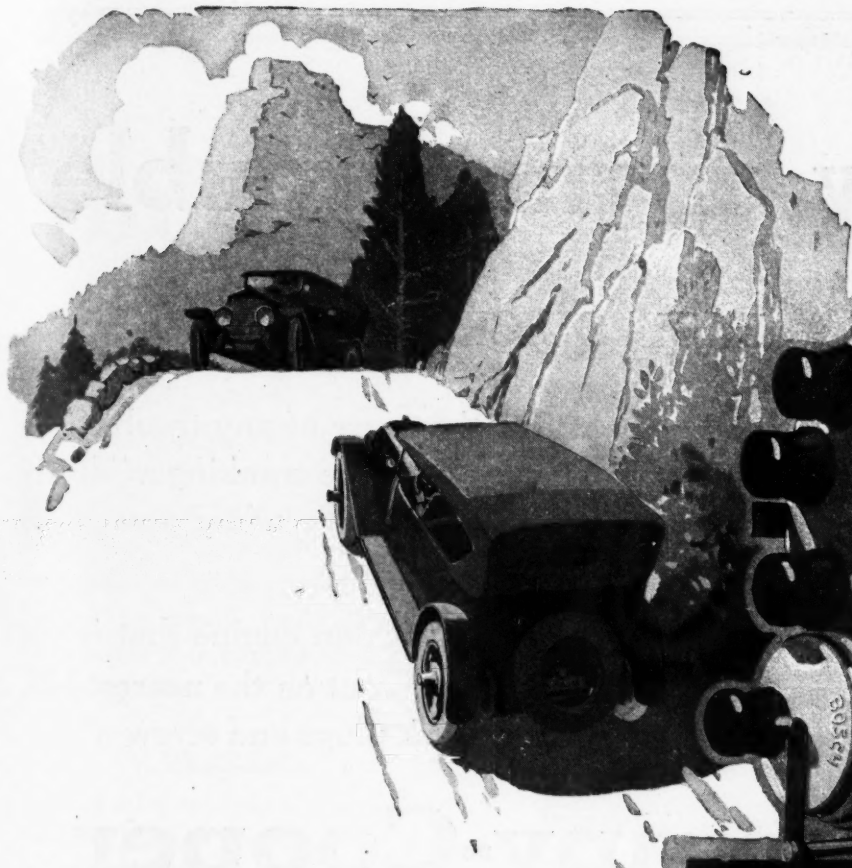
Wire Wheel Division Hayes Wheel Company Jackson, Mich.
World's Largest Builders of Wheels—Wire, Wood, Steel

Sales and Service Stations:

Brooklyn Service Co.	Chicago Wheel & Rim Co.
1194 Bedford Ave. Brooklyn, N.Y.	2010-12 Wabash Ave. Chicago, Ill.
Hayes Wire Wheel Sales Corp.	Auto-Marine Service Co.
842-7th Ave. & 146 W. 55th St. N.Y.C.	1027 Nicollet Ave. Minneapolis, Minn.
Evans & Lawrie Co.	Interstate Auto Company
1090-2 Commonwealth Ave. Boston	206-8 E. Superior St. Duluth, Minn.
Samuel Scott	Motors Equipment & Tractor Co.
2038 Ranstead St. Philadelphia, Pa.	1310 S. Grand Ave. Los Angeles, Cal.
Miller & Woodward	H. V. & C. H. Carter
3751 Bigelow Blvd. Pittsburg, Pa.	724 Van Ness Ave. San Francisco, Cal.
Brigman Motors Company	Automotive Supply Company
491 Whitehall St. Atlanta, Ga.	1558 Broadway, Denver, Colo.
Siggins Sales Company	The Three Captains Co.
106-8 E. Milwaukee Ave. Detroit	700 S. Ervay St. Dallas, Texas
Eldredge Buick Company	
Seattle, Wash.	



HAYES *wire wheels*



THE nearest Bosch Service Station can install America's Supreme Ignition System on any engine in a few hours time.



Put the Power of Bosch Ignition Behind Your Name

THERE is an automobile dealer in New York who adds a Bosch Magneto to every car he sells. He knows the sales asset that Bosch Equipment gives him. His customers are glad to pay the added cost because they know that Bosch Magneto Ignition means absolute Ignition satisfaction.

The automobile you sell can be Bosch Equipt if you insist on it. Write for further information.

AMERICAN BOSCH MAGNETO CORPORATION

Main Office and Works—Springfield, Mass.
Branches—New York, Chicago, Detroit, San Francisco
More Than 200 Service Stations in Over 200 Cities

Be Satisfied!

*Specify
Bosch*



AMERICA'S SUPREME IGNITION SYSTEM

MOTOR TRUCKS - TRACTORS - AIRPLANES - MOTOR CARS - MOTOR BOATS - MOTORCYCLES - GAS ENGINES - ETC.



A new way to find every engine trouble

THE HEMPY-COOPER

Motor Tester is another of the real helps to a motorist and repairman sold under "The Fairbanks Company O. K." Some of the others are:

Motor Testers
Bearing Burning-in Machine for Ford and Fordsons
Motor Test Stands
Engine and Axle Stands
Bearing Boring Machines and Re-Babbiting Jigs
Cylinder Re-boring Machines for Fords and Fordsons
Straightening Presses
Arbor Presses
Power Grinders
Air Compressors
Transmission Reaming Machines
Special Ford Reamers
Rear Axle Sleeve Pullers
Radiator Test Plugs
Piston Clamps
Connecting Rod Straightening Jigs
Bench Motor Clamps
Transmission Drum Clamps
Rear Axle Pinion Gear Presses
Pinion Gear Pullers
Piston Bushing Reamers
Crank and Cam Shaft Testing Machines
Emergency Wheel Clamps
Wheel Pullers
Valve Port Renewing Tools
Bushings Drivers
Turning Bars
Speed and L. Wrenches
Special Jacks
Rim Tools
Tow Bars
Combination Electric Drills and Valve Grinders
Visible Measuring Gasoline Pumps
Special Ford and Fordson Tools and Machines

All are listed in Catalog 8—ask for your copy.

EASY, QUICK, POSITIVE!

Here is a quick way to find the cause of any trouble in a gasoline engine of any type. No more cranking a "dead" engine; no need to run an engine idle while you guess what is wrong.

Suppose a customer drives up with an engine that is not working properly. Instead of a tryout on the nearest hill, open the hood, take out the spark plugs and screw a

Hempy-Cooper Motor Tester

in the place of one of them. Bring the piston up to compression dead center, and the value on the tester tells just what the compression is and how fast it leaks off. Now let the handle up and bring it down sharply. You can hear air hiss through a leaky inlet valve and out through the carburetor. If the exhaust valve leaks, you can hear the air rush through the manifold and

into the cylinder that is on exhaust cycle.

Other faults can be found with the Hempy-Cooper Tester. Loose bearings, loose piston rings, piston slap, for each there is a positive indication. You can keep right on testing as you adjust.

A Hempy-Cooper Tester takes guess work out of your testing—with it you can tell your pa-

The

FAIRBANKS

MILL, MINE & RAILWAY SUPPLIES - SCALES - VALVES - POWER TRANSMISSION - MACHINE TOOLS

while not running

trons exactly what is wrong, how much it will cost to fix it, and how long the job will take. The very simplicity of the Hempy-Cooper Tester is evidence of its reliability. There are no valves to get out of order, no springs to break, no small parts to lose. Just screw it in place and you are ready to test.

DEALERS

A good thing to show to the mechanically-inclined motorist. Fully protected by patents.

THE FAIRBANKS COMPANY

Administrative Offices, New York

Albany	Detroit	Providence
Baltimore	Hartford	Rochester
Birmingham	Newark	Scranton
Boston	New Orleans	St. Louis
Bridgeport	New York	Syracuse
Buffalo	Paterson	Utica
Chicago	Philadelphia	Washington
	Pittsburgh	

Havana, Cuba; London, England
Birmingham, England; Glasgow, Scotland
Paris, France

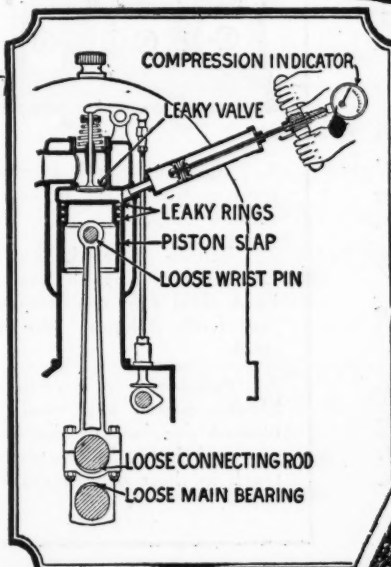
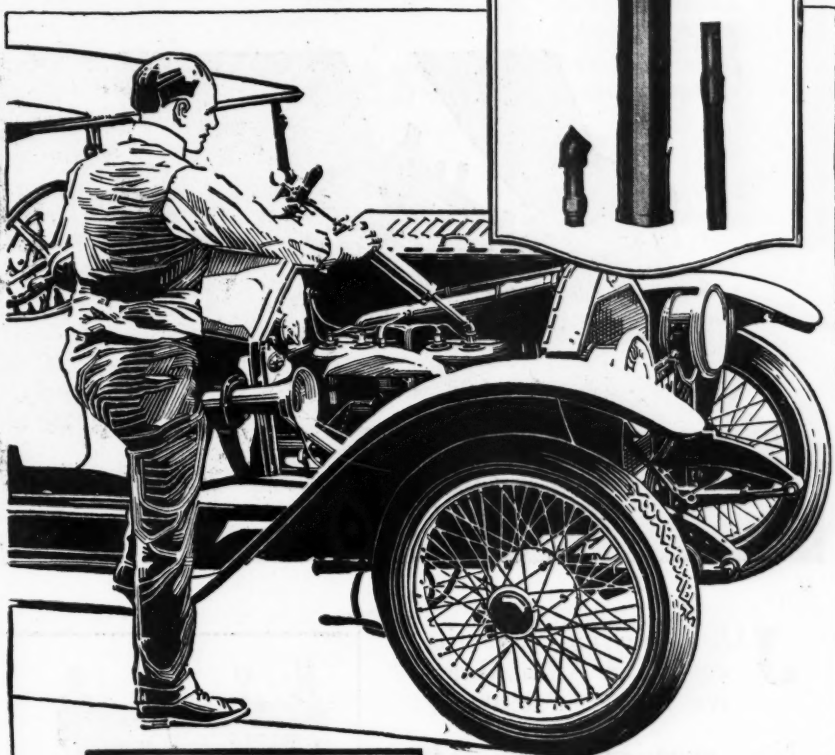
Sole Distributors for

The Service Station Equipment Company.

The Hempy-Cooper Manufacturing Company.

The Peterson Engineering & Manufacturing Company.

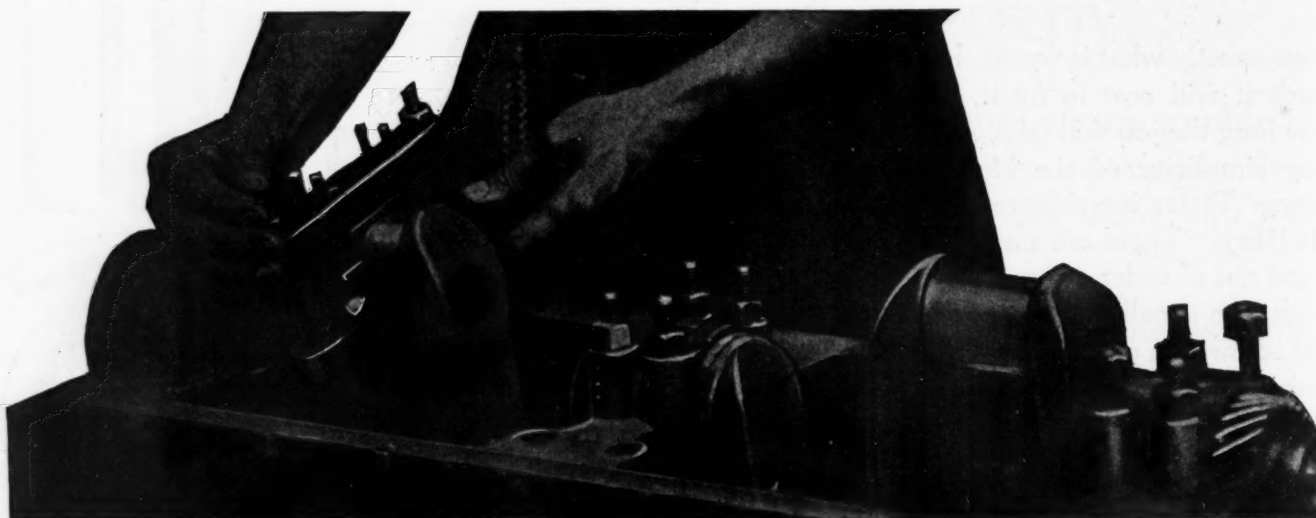
The Steere-Kitson Company
and other manufacturers of
garage equipment.



The Hempy - Cooper Tester and how it works. Price \$18.00 including fittings for 1/2 in. standard, 3/8 in. S. A. E. and Metric spark-plug holes. Fully protected by patents.

Company

The Quick, Easy and Profitable Way to Grind a Crankshaft



JUST one job pays the cost of an Atlas Abrasive Tool. (Patented.)

No experience required. The Atlas simplifies crankshaft grinding.

No lathe or other equipment required. Use a vise if you like, but remember that the crankshaft need not be removed from the crank case.

One hour completes the work on any crankshaft.

No machine shop guarantees greater than two-thousandths of an inch accuracy. With the Atlas you get one-thousandth.

If you need an Atlas but once a year, it accommodates your customer, puts a good profit in your pocket and gives you a reputation for service.



1. Hardened and tempered steel cutter. Cuts in one direction only.

2. Bronze track bearing. Cannot cut ring in pin like hard steel nor freeze against pin from friction like soft steel.

3. Adjustable Abutment Blocks, which slip easily up against the face of the crank pin and hold the cutter and track in their proper working place.

Another hand tool would cost from five to ten times the price of an Atlas—you would not get Atlas con-

venience—nor simplicity of its one cutter principle—nor the saving of time in making adjustments.

Adjustable to crank pins and bearings up to $2\frac{1}{2}$ inches diameter for all passenger cars and trucks.

Hundreds of garages and repairshops are enthusiastic users of the Atlas Abrasive Tool—it's selling like hot cakes.

A good mechanic would rather part with a \$50 bill than with his Atlas, if he could not buy another.

Price, complete with cutter, \$10, postpaid. Extra cutters (including bronze bearing tracks) good for from 10 to 20 pins or bearings, 30c each.

Wire your order today.

ATLAS MFG. CO.

North Canal St., Pittsburgh, Pa.



Through:

Asbestos

and its allied products

JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High
Temperature Cements,
Asbestos Roofings,
Packings, Brake
Linings, Fire
Prevention
Products

IT is our aim, not only to make the best products, but to market them by the best method.

Many thousands of users will admit the success of the former—all who handle Johns-Manville Automotive Equipment will concede the latter.

Read, on the following pages, about three representative Johns-Manville products which have proved their worth to motorist, to jobber, and to dealer through honest workmanship and genuine co-operation.

H. W. JOHNS-MANVILLE CO.
New York City

10 Factories—Branches in 63 Large Cities

JOHNS-MANVILLE

AUTOMOTIVE EQUIPMENT



Non Burn

DEALERS have found that, year after year, their customers willingly accept Non-Burn for brake-lining renewals.

There can be only one reason for this:— Non-Burn Asbestos Brake-Lining renders complete satisfaction—often when other linings have utterly failed.

That is why it is easiest to sell—and why the experienced buyer insists on Non-Burn again and again.

Considering also the protection afforded you, by our sales policy, it is hardly any wonder that we have been handling constantly increasing orders for this equipment.

Brake Lining

Speedometer

HOW about a Speedometer?" There's a phrase that often earns the dealer a dollar or more a word.

To the Ford Owner, the Johns-Manville Speedometer offers a mechanical means of knowing accurately "how fast," "how far," "how much expense."

To you, it offers an opportunity to make a remarkably good profit on a quick-selling accessory.

Try asking any Ford driver—"How about a Speedometer?"

Price, \$12.00, complete with Instrument Board. West of Denver, \$13.00.



Fire Extinguisher

If they ever catch fire—
they're gone!

UNLESS—in car, garage and home—
there is an efficient fire extinguisher
instantly available to kill the incipient blaze.

Impress this fact on your customers by
window displays and demonstrations. Show
them the risk they run without adequate,
quick-acting fire protection. Tell them
what sort of fire protection they need—

Sell them this better, faster, safer fire-
fighter that is easiest to demonstrate and
quickest to sell—the Johns-Manville Fire
Extinguisher.

Prices: Brass or Nickel Finish, Bracket
included, in U.S. East of Colorado, \$10.00.
\$10.50, Colorado and West. Dominion of
Canada: \$12.00, East of Calgary. \$12.50,
Calgary and West.

The Johns-Manville Fire Extinguisher is
examined, approved and labeled by the
Underwriters' Laboratories, Inc.

Cars or trucks equipped with the Johns-
Manville Fire Extinguisher save 15% on
cost of fire insurance.

Look for
the lever
controlling
the stream.

JOHNS-MANVILLE

AUTOMOTIVE EQUIPMENT

A Complete Outfit

Perhaps your establishment demands a compressor outfit of peculiar arrangement—possibly no assembled machine would conveniently fit the available space or meet other requirements. If this is your problem, the Brunner line includes various items from which you can select the proper apparatus and set it up to meet the conditions. Either belt driven or motor driven compressor models are offered—also a complete line of valves and fittings.

For instance, the No. 6 Outfit:—A No. 42 compressor with proper tank, gauge, hose, valves, etc., all boxed and ready to install in the manner best adapted to the location. Full instructions are furnished and any questions will be answered by Brunner engineers. This outfit or another similar Brunner outfit, may be just what you have been seeking.

Consult your jobber or write us giving full details of your air service problem.

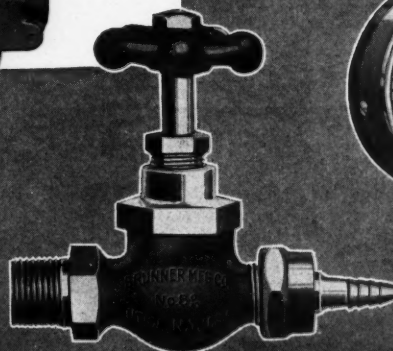
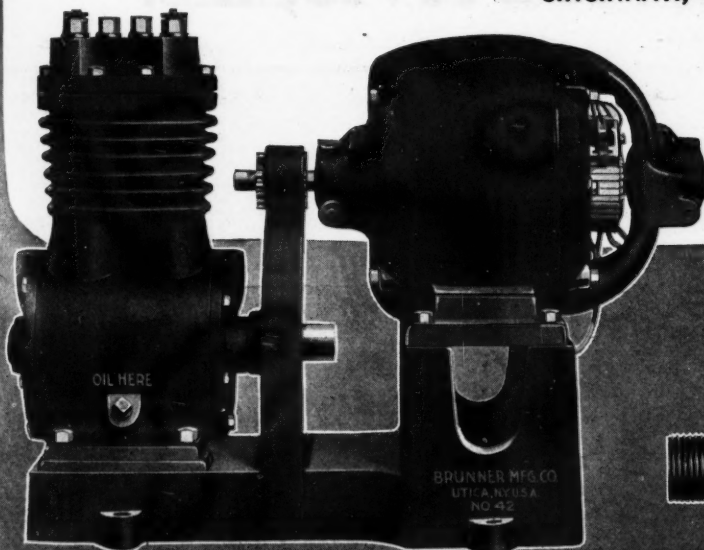
Brunner Manufacturing Co.

Works: Utica, N. Y.

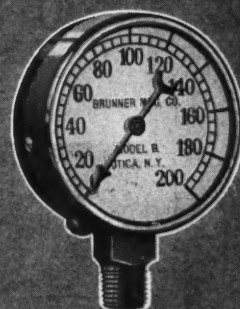
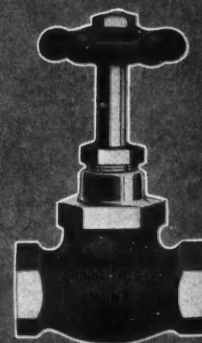
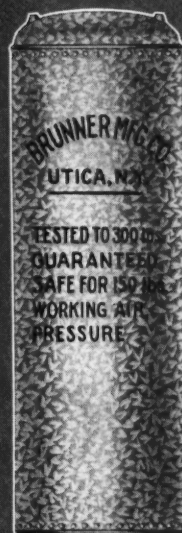
Sales Offices:

UTICA, N. Y.

CINCINNATI, O.



BRUNNER



STARTING



GRAY &

GRAY & DAVIS Starting-Lighting-Ignition systems have been adopted by leading motor car builders, because of exceptional quality plus the knowledge that G & D equipment gives satisfactory service under ALL conditions. Gray & Davis systems are bought and used solely on the basis of reliable performance.

GRAY & DAVIS, Inc.

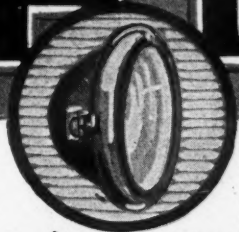
BOSTON

MASS.

IGNI



LIGHTING



DAVIS

LONG EXPERIENCE in building electrical equipment, proven design and simplicity add essential factors which make for efficiency. The better grade of materials and skilled workmanship assure Quality—Quality which is immediately recognized and appreciated by builders and users of motor cars.

GRAY & DAVIS, Inc.

BOSTON

MASS.

TION

Things Savage Axles do not do

- ① Waste power
in friction

*From no load to full load—
from high gear to low gear
the efficiency scarcely varies*

SAVAGE ARMS CORPORATION
SHARON, PA.

UTICA NEW YORK DETROIT PHILADELPHIA





The full power is available on low gear for pulling up grades and out of holes. The leverage of the chain drive is accomplished without its objectionable features

This is No. 1 of the things Savage Axles do not do



SAVAGE



AMERICAN TRUCKS ARE SUPREME

LEADERSHIP of the international truck industry centers in the United States, simply because American built trucks are standard of the world—representing incomparably better value, dollar for dollar, than any produced elsewhere on the face of the globe.

And, among America's many fine examples of heavy duty vehicles, **HALL TRUCKS**

are, at least, equal to the best.

That's because **HALL TRUCKS** are the direct result—the definite physical answer to a great haulage problem, successfully worked out by **THE LEWIS-HALL IRON WORKS** organization in its own cartage interest.

An organization possessed of a daily knowledge and experience in the fabrication of metals—the basic

material from which all trucks are made—dating back to 1873.

Each **HALL TRUCK** is the product of that knowledge and experience.

Each **HALL TRUCK** carries with it 46 years manufacturing and business responsibility.



A Hall 5-7 Ton Truck

Naturally the conservation of that Good Will, built up during all those years, means

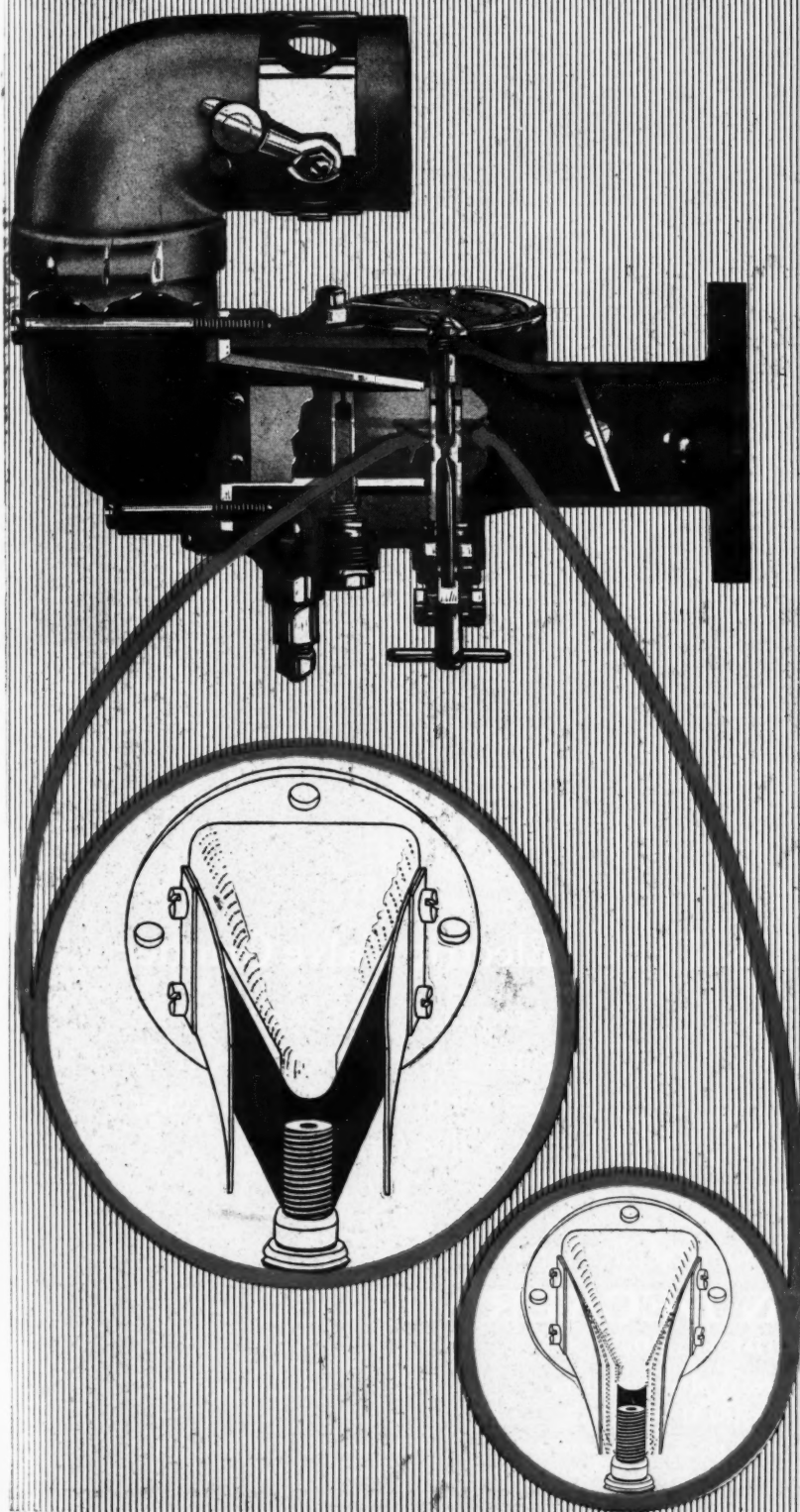
*that each **HALL TRUCK** is as good as money, material and master-metal-skilled-workmanship can make it.*

We have some splendid open territory and our selling franchise covers a complete truck line of 4 chassis models and any type of body. We will consider it a privilege to explain our dealer proposition to you. Address, Sales Manager, 17 Robey Street, Detroit, Michigan.

As Manufactured by
The LEWIS-HALL IRON WORKS
DETROIT, MICHIGAN.

Tillotson

CARBURETOR



Automatic Air Valve

THE Tillotson air valve is set primarily to equal the requirements of the motor at idling speed with the throttle closed.

From that fixed point the air valve automatically responds, by atmospheric pressure, to all throttle ranges and maintains an unvaryingly uniform mixture that insures the highest motor efficiency at all engine speeds.

The action of the Tillotson Carburetor is not only smoothly flexible, but instantly positive in its delivery of the correct mixture necessary to develop utmost power.

With its simplified design and superior advantages, the Tillotson Carburetor represents a scientific achievement no less than it does a practical solution of carburetion problems.

Let us confer with you on your requirements.

The Tillotson Manufacturing Co.
Toledo, Ohio.

BLACK & DECKER

Electric Valve Grinder

"With the Pistol Grip and Trigger Switch"



4 HOURS BY HAND

35 Minutes with a Black & Decker Electric Valve Grinder

This is the experience of a large Hudson Service Station in which this picture was taken. The complete job of grinding in all the valves of a Hudson Supersix for-

merly required four hours' work. The same job is now done in 35 minutes with a Black & Decker Electric Valve Grinder.

May we send you complete information?

THE BLACK & DECKER MFG. CO.

BALTIMORE, MD., U. S. A.

Portable Electric Drills

Electric Valve Grinders

Electric Air Compressors

BRANCH OFFICES:

New York, N. Y.

Philadelphia, Pa.

Atlanta, Ga.

San Francisco, Cal.

Chicago, Ill.

Detroit, Mich.

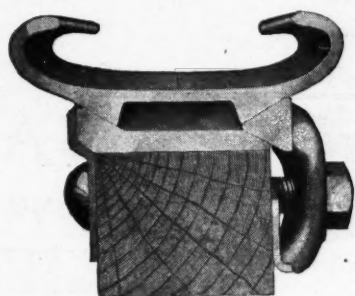
Columbus, Ohio.

Buffalo, N. Y.

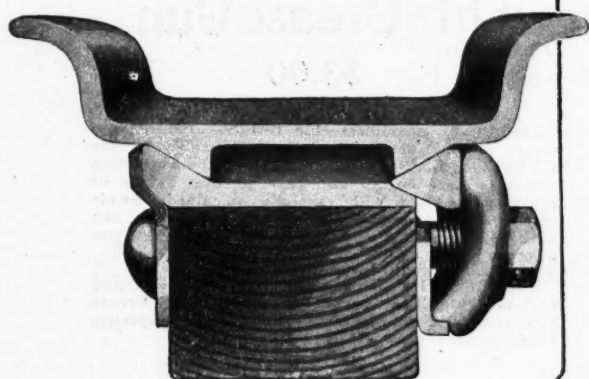
Boston, Mass.

London, Eng.

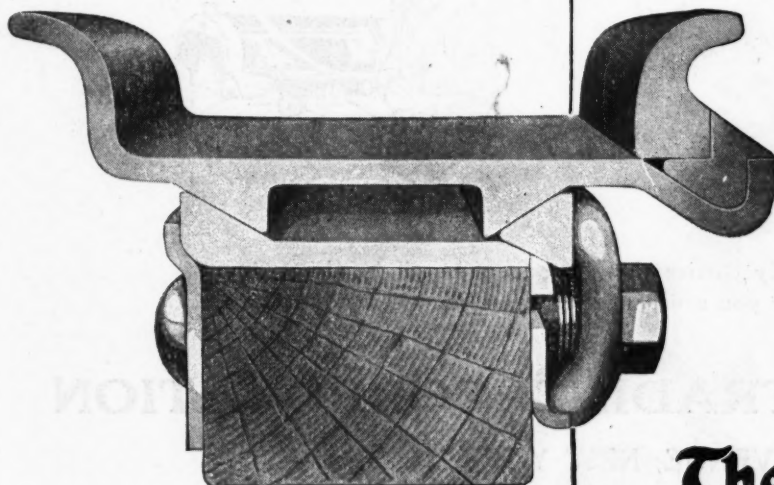
Firestone RIMS



Type F
Continuous base Demountable Rim for
30x3 1/2 clincher tires.



Type E
Split base Demountable Rim for passenger cars.
For straight side tires only.



Type C
Continuous base Detachable, Demountable Rim for
passenger cars and trucks. This type of rim in the
6-in., 7-in., 8-in. and 10-in. size is the rim which has
made the use of Giant Pneumatic truck tires prac-
tical. For straight side tires.

- quick detachable
- demountable
- no complicated parts
- no squeaking
- accurate alignment
- continuous bearing on
felloe band
- continuous wedge ring
support

—The supremacy of Firestone Demountable Rims is evidenced by the fact that they are standard equipment on the majority of high class passenger and commercial cars now manufactured. Firestone Type C Rims for trucks have put speed and greater mileage into trucking.

—There is a Firestone Rim for every kind and size of tire and for every type of service. See the Firestone Rim dealer or write for facts.

**The Firestone Steel
Products Co.**

FIRESTONE PARK

AKRON, OHIO



NEMOURS Has Selected These

Of the host of accessories the Nemours Trading Corporation has selected these three—a really simple and effective shock absorber; a timer which is on the job all the time; and the best known, the original, sprayer-polish.

VICTORY SHOCK ABSORBERS FOR FORD CARS

PATENTED MAY 13, 1919. NE. 1303816

\$2.50

Victory Shock Absorbers effectually prevent excessive spring recoil and side-sway. Eliminate vibration and keep the rear wheels on the road where they belong. Installed in fifteen minutes without drilling or fitting. Two dollars and a half the set of two.

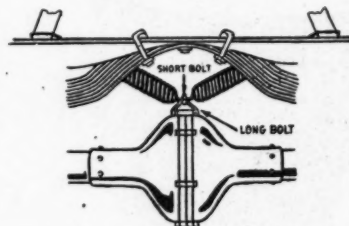


WONDER-MIST

35¢ to \$3.00
½ PINTS to GALLONS

Wonder Mist is the original, safe, greaseless, sprayer-polish. On it goes and off comes the dirt. A clean, lasting polish without the use of soap or chamois. Toughens the finish, proof against scratching.

Our other well-known products are the Woodworth Tire Spreader, McCulloch Timer, and King Crank Holder for Ford Cars.



The E. Z. Fill Oil & Grease Gun

\$3.00

Strength and cleanliness—the two essential requirements of any grease gun—are exemplified by the E. Z. Fill Grease Gun. Its special construction makes it easy to fill and easy to use. Made of heavy gage brass with carefully machined threads and accurately dimensioned working parts, it can be depended upon to put the grease right where you want it.

The E. Z. Fill Grease Gun takes the dirt and back-breaking labor out of greasing a car. Grease cups and axles are filled with equal ease. Capacity, 8 oz. grease; one-half pt. oil.



Your jobber undoubtedly carries these products but if he does not, write to us and let us show you a way to better selling.

THE NEMOURS TRADING CORPORATION

151 FIFTH AVENUE, NEW YORK, N. Y.



ANDERSON

BEAUTY *Linked with* UTILITY

The Convertible Roadster is more than a car of appealing beauty—it is a car of all-round utility—a car for business needs or pleasure jaunt.

For it is a composite car—a dashing roadster that can be transformed as if by a magician's wand in a twinkling to a commodious five passenger touring car.

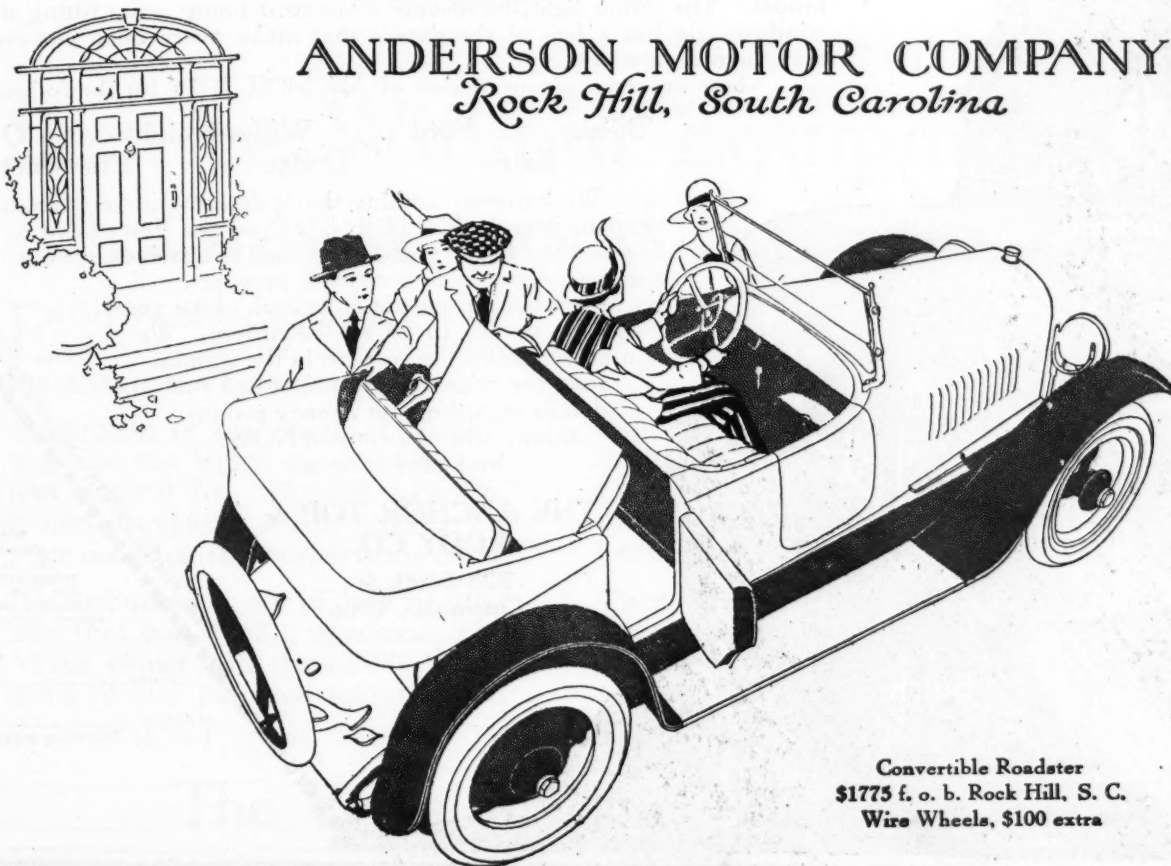
The Convertible Roadster is a patented Anderson feature. Twenty-three years of experience in coach-building stand in back of it.

The Anderson line is complete, comprising five and seven passenger touring, four passenger sport touring and convertible Sedan all built on the same staunch chassis.

National advertising is putting Anderson in the forefront of motor cars. Why not share in this success?

The carburetor is a Rayfield assuring maximum mileage from low grade fuel.

ANDERSON MOTOR COMPANY
Rock Hill, South Carolina



Convertible Roadster
\$1775 f. o. b. Rock Hill, S. C.
Wire Wheels, \$100 extra

Anchor Top Dealers Will Make Big Records This Year

Send in the Coupon Now for the facts

ALL Anchor Top sales records will be broken this year. Last year Anchor Top Dealers made phenomenal successes. But this year's sales will far out-distance all previous years.

That's because more and more motor car owners are awakening to the wonderful comforts and pleasure of closed car protection.

No longer are motorists content to lay up their cars in bad weather just when they need the car most. Or to depend on flapping side curtains that mean discomfort, and expose them to sickness.

Anchor Top Sedan Coupe Glass-Enclosed

Another reason is the attractive ANCHOR TOP advertising in such nationally read publications as the Saturday Evening Post, Literary Digest, Successful Farming and Motor. These advertisements will convince hundreds of motorists of the need for ANCHOR TOPS for their open cars.

An ANCHOR TOP transforms an open car into the finest enclosed model. The dome light, handsome whip-cord lining, snug fitting doors and windows are but a few of the details that make every open car owner who sees them a sure sale.

There are now twenty models of ANCHOR TOPS for the following cars:

Buick	Ford	Willys-Knight	Overland
Essex		Dodge	Chevrolet

We know of nothing that offers the money making opportunities of ANCHOR TOPS. You don't have to SELL ANCHOR TOPS. They sell themselves. Every open car owner in your city is a prospect. But remember our output is limited. Last year we were unable to fill all the orders. We urge you therefore to send in the coupon today for prices, photo prints and full details regarding our agency proposition. Clip the coupon NOW, and send it to us.

THE ANCHOR TOP & BODY CO.

323 South St.,
Cincinnati, Ohio

*Fine Coach Builders
for 30 years*

The
Anchor
Top &
Body Co.
323
South St.,
Cincinnati,
Ohio

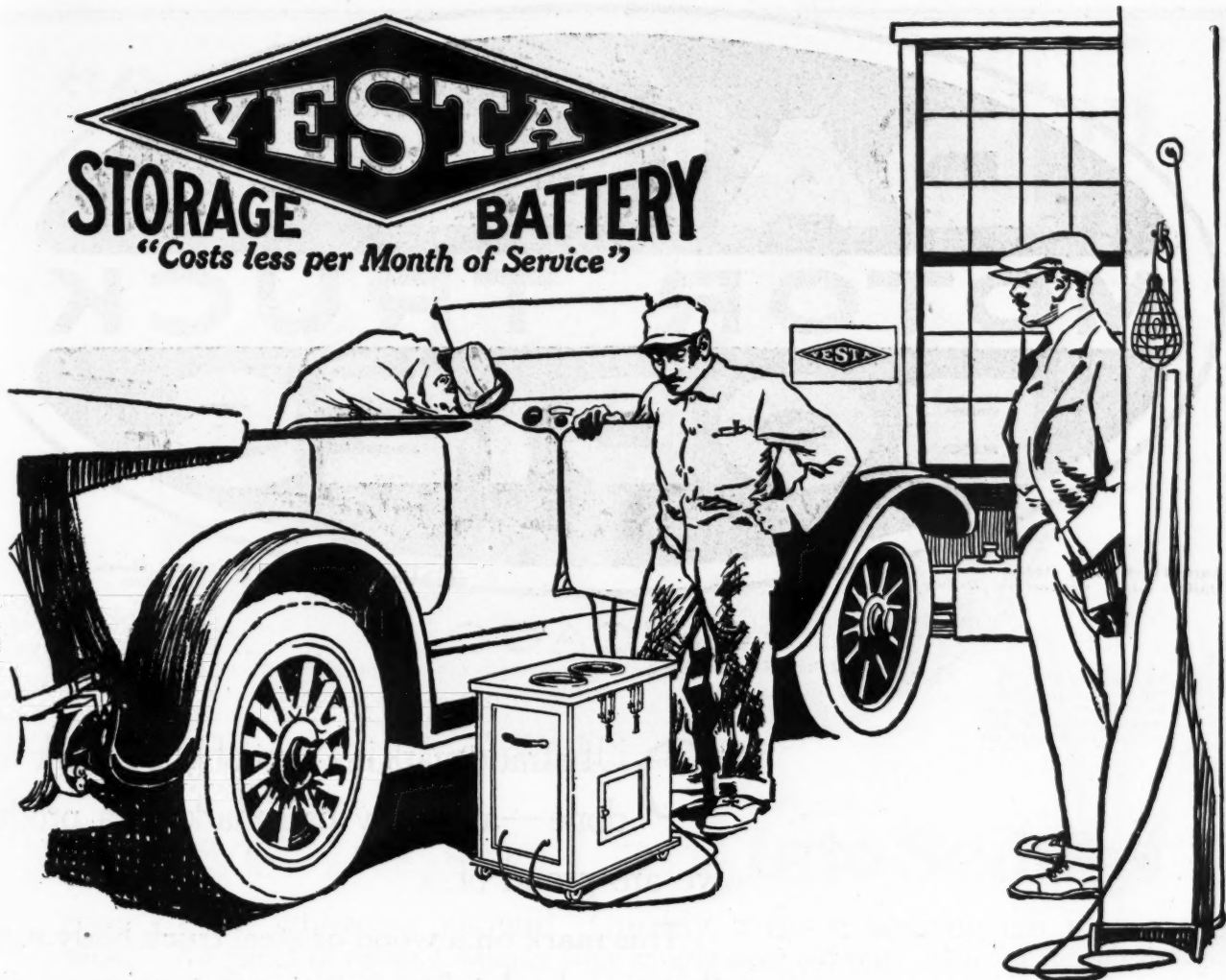
Without incurring obligation I would like to see photo-prints and prices of Anchor Tops. Also full information regarding your agency proposition.

Name.....

Address.....
I sell the following makes of cars:

FOR PHOTO-PRINTS AND PRICES





Service Without Equipment Is Only a Good Intention

EACH Vesta Service Station, wherever it is located, is equipped to make complete battery repairs.

Regardless of the make of battery you use, the Vesta dealer will read and water it free. He will recharge it and provide a rental battery for your use while the work is being done.

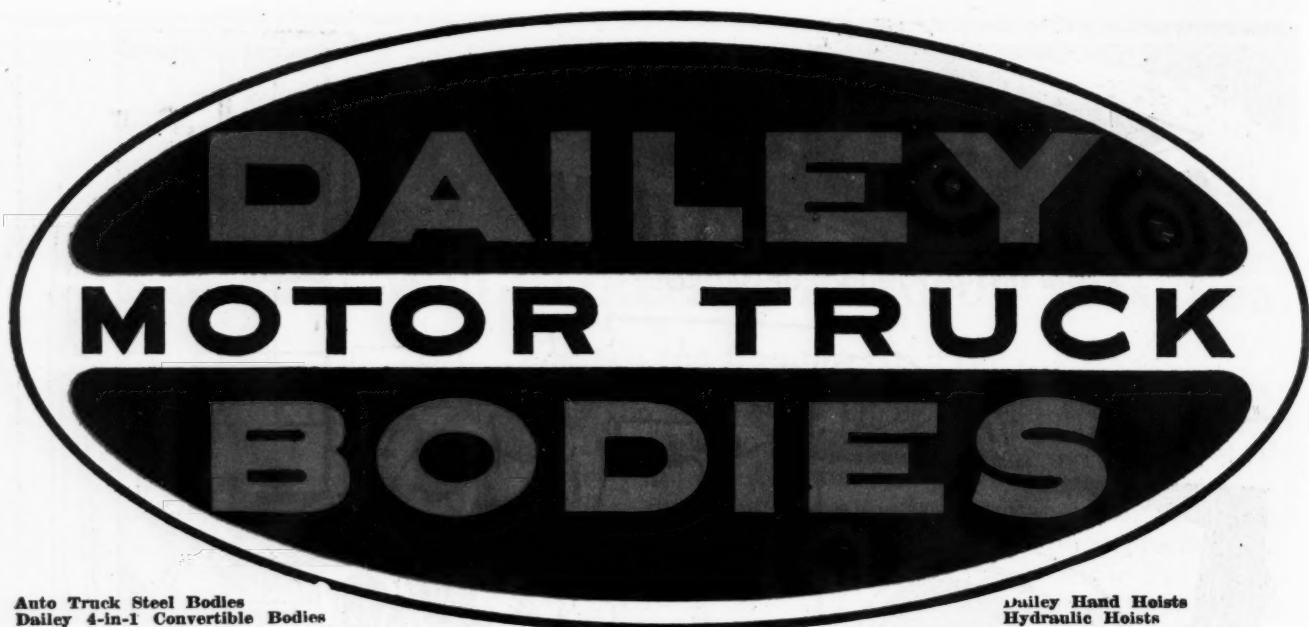
If your battery is out of order it is no sign that you need a new one. The Vesta dealer will repair it, using some of the patented features that

have made Vesta batteries famous.

It is this complete equipment, and the resulting ability to give *real* battery service that has made Vesta dealerships so profitable. Each year the Vesta good-will among motorists multiplies, making the Vesta sign an increasingly valuable asset.

There are still a few localities in which we wish to make connections with dealers prepared to live up to the high standards of Vesta service.

The Vesta Accumulator Co.
2100 Indiana Avenue
Chicago, Illinois



CHICAGO

OUR trade mark is a sign of good work well done—a quality hall mark on a product we are proud of.

This mark on a wood or steel truck body means that we absolutely guarantee it to give unqualified satisfaction to the buyer.

We have grown with the truck industry, building our reputation on a firm foundation—dealer service and customer satisfaction.

It is our aim to help dealers sell their trucks by promptly supplying them with the body most suitable to their customer's need. We can design and deliver the body you require in record-breaking time.

Superior materials—assembled by the skilled workmen in our experienced organization—put long life and hard work into our products. Our trade mark backs them up.

Write us for booklets and full information on Dailey Bodies and Dailey Service

H. R. DAILEY, Auto Truck Steel Body Co.

3028 Carroll Avenue,

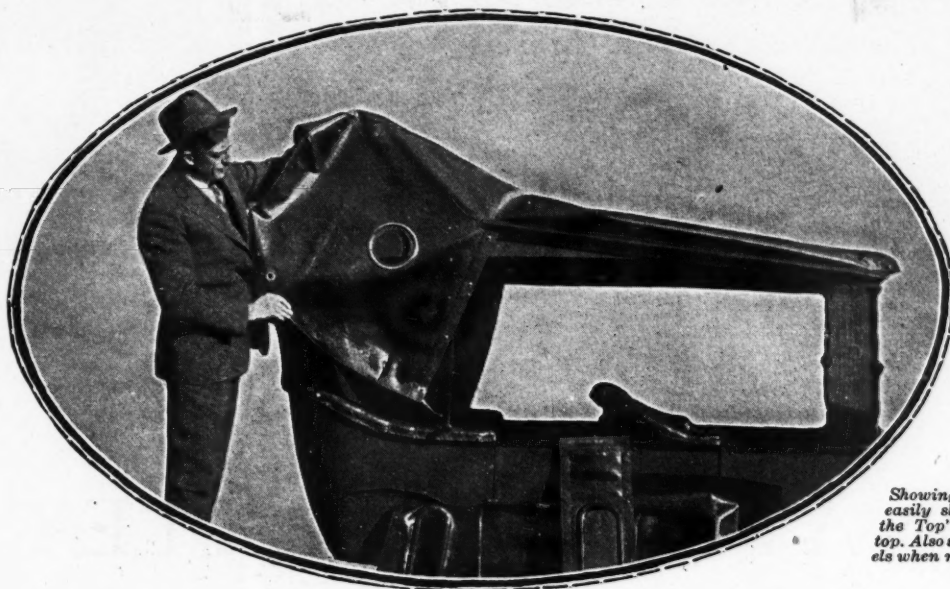
Chicago, Ill.

**Steel and Wood Body
Distributors**

Auto Truck Steel & Wood Body Co.,
1815 N. 23d St., St. Louis, Mo.
Auto Holst & Body Co., 18 Bain-
bridge Street, Brooklyn, N. Y.
Simplex Commercial Body Co., 1170
Jefferson St., Buffalo, N. Y.
The Truck Engineering Co., 3533 Ce-
dar Avenue, Cleveland, Ohio.
Hydraulic Holst Mfg. Co., 715 Lor-
raine Avenue, Detroit, Mich.
Auto Holst & Body Co., 333 Avenue
B, New York City, N. Y.
Troy Trailer Co., 5 North 21st St.,
Philadelphia, Pa.
Thomas & Company, Braddock Ave-
nue, near Forbes Street, Pitts-
burgh, Pa.
Simplex Mfg. Co., Conneautville, Pa.
The John Immel & Sons Co., Colum-
bus, Ohio.
Springfield Commercial Body Co.,
385 Liberty St., Springfield, Mass.
Springfield Commercial Body Co.,
Cambridge, Mass.

"Over the Top" Auto Top

"Over the Top" Auto Top manufactured under the Trumbly Patent by Baker-Lockwood Mfg. Co.



Showing how one man easily slips the "Over the Top" over the old top. Also shows side panels when not in position.

Convert Open Cars Into Sedans

Easy to sell wherever shown! Quickly turns a touring car into a sedan. No joints to rattle. Simply slips snugly over old top. Can be attached to the car much easier than ordinary side curtains. Real glass windows, giving perfect road vision from all seats.

No special frame. No bulky, box-car appearance to cause top-heavy feeling. Easy to carry in stock as they require very little shelf room. Weigh but 30 to 50 pounds, according to size of car. Can be carried under the arm. Popular because they're practical, dependable, and

reasonable in price. Be prepared for the great demand that's sure to come with cold weather.

We also have ready for delivery many other popular "Baker Necessities," such as "Over the Top" Auto Tops, Anti-Draft Shields, Foot Pedal Shields, Bad Weather Mats, and Rain Guards.

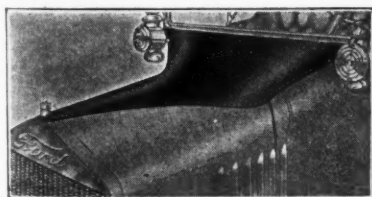
Buy "Baker" Automotive products from your jobber, or write direct to our nearest factory.

BAKER AND LOCKWOOD MANUFACTURING CO.

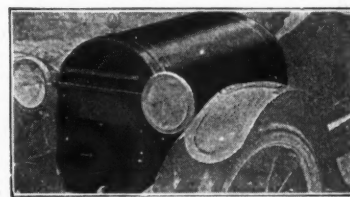
BROOKLYN, N. Y.
473 Kent Avenue

KANSAS CITY, MO.

CHICAGO, ILL.
3021-23 Michigan Ave.



Rain Guards for Ford cars prevent water from reaching ignition



Hood and Radiator Covers are essential to economical cold weather operation



Releasing the NATIONAL SEXTET

THE new National is a Six. It is, we state without reserve, the finest automobile we have ever produced. More, it has the ablest engine that National engineering talent has ever conceived, blue printed, and translated into metal. And this engine is built complete in National shops.



National

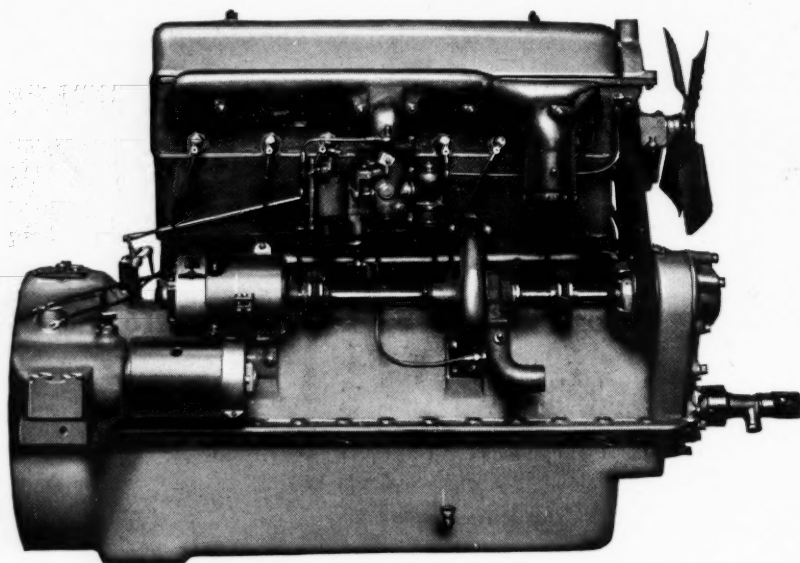


The NATIONAL
SEXTET

FIVE CUSTOM BUILT BODY STYLES



Engine Toughness Through Perfect Balance



We, who already are intimate with the new engine of the National Sextet, are convinced that exceptional toughness is its salient quality.

In both dynamometer and road tests, this engine has demonstrated an ability to stand up and assimilate punishment that is unusual even for National engines, whose record for stamina is unsurpassed.

This toughness is due to the use of the finest materials in the engine's construction, and to the achievement of a perfect balance, milli-

gramatic in exactness, between each and every part.

Combined with this extraordinary toughness is an abundant, flexible, unobtrusive power that makes for absolute road mastery, easy driving and quiet operation.

It is an engine of the improved overhead-valve type, with long stroke and small bore, and is featured by a novel and unusually efficient system of force-feed lubrication and by a valve mechanism that is a distinct improvement over common practice.

An average factor of safety of six to one in all vital parts gives the engine of the National Sextet a toughness that is extraordinary

NATIONAL MOTOR CAR & VEHICLE CORP., INDIANAPOLIS

Twentieth Successful Year



The New Sextet Has Proved Its Right to the Name of "National"

NATIONAL automobiles are built to but one standard. That standard is exclusively National. It has been established by National cars through two decades of pioneering, development and achievement.

So when we say that the new Sextet is the best National that has ever left our shops, we can give it no greater praise.

The name of "National" has always meant, in the world of automobiles, a fine and sturdy car motored by a powerful, reliable engine of advanced design.

And the Sextet had to prove its right to such a respected name before our engineers would consent to its release after two years of tireless test and continual improvement.

Physically, the National Sextet is a most attractive car, distinctive and individual without being the least bit freakish.

The Sextet is made in five custom-built body styles—seven-passenger touring car, four-passenger phaeton, two-passenger roadster, four-passenger coupe and seven-passenger sedan.

A new and advanced method of mounting insures stability and eliminates all squeaks and rattles.

The many niceties of design and appointment stamp the Sextet as a National and nothing else, and lead to the appraisal of the owner as a man of excellent taste.

The fenders have been moulded in graceful curves. There is a sharp break between the running board and the front wheel guard that is emphatically individual. The mahogany instrument board is as clean and businesslike as an executive's desk.

The Sextet is truly a National, in performance and appearance. And that's saying a lot in a few words.

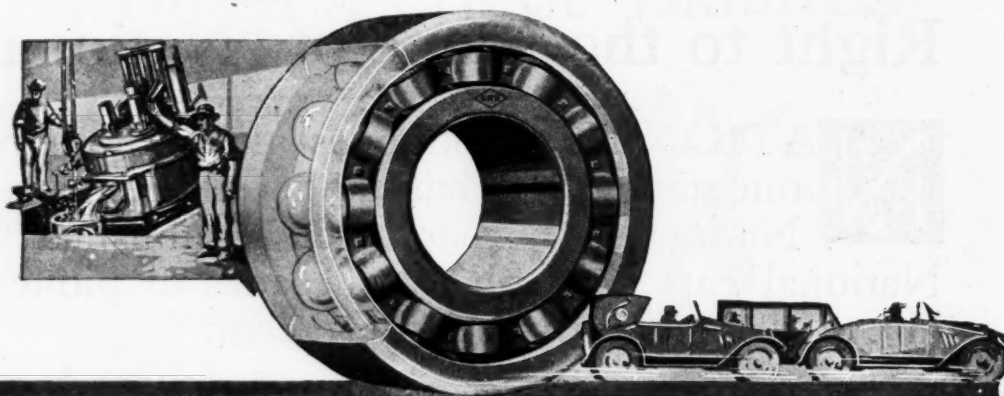
NATIONAL MOTOR CAR & VEHICLE CORP., INDIANAPOLIS
Twentieth Successful Year



MARLIN-ROCKWELL INDUSTRIES



Ball Bearing Quality Begins in the Crucible



AT the Braeburn Steel Company, near Pittsburgh, owned and operated by ourselves, we make the High-Chrome-High-Carbon Steel for

SRB

Single Row

Double Row

Annular Ball Bearings

THE difficulties and uncertainties of securing in the usual market a steady supply of bearing steel of unvarying highest quality to meet our growing requirements, determined us to purchase the Braeburn Steel Company, one of the pioneer tool steel mills of the country, which our records showed had furnished the best steel over a period of years. Now, after a year of standardization work, we have accomplished for ourselves what could not be done for us — adapted a single source of steel to our entire requirements, eliminating all variations from our exacting quality standard and insuring at all times regularity and adequacy of supply. •

Thus in the manufacture of **SRB** bearings we safeguard and co-ordinate every step of manufacture from the raw metals to the superbly finished product that is called upon

to function with unfailing reliability at the most critical load-carrying friction points in automobiles, trucks, tractors, and industrial machinery.

In our own mill we are able to specialize in our bearing steel as can not elsewhere be done, assuring a correctness and uniformity of method in the "heats" of the electric furnaces, the hammering and rolling of the ingots, and finally the all-important process of "annealing," for which especially designed furnaces have been provided.

The **SRB** mark on Ball Bearings or Taper Roller Bearings is proof of the most highly specialized products of their kind. You will find them in those motor cars, trucks and tractors whose names are instantly thought of as leaders in their respective fields.

Fully Equipped Service Stations in Principal Cities

Standard Roller Bearing Company
Philadelphia

Braeburn Steel Company
Pittsburgh

Owned and Operated by

MARLIN-ROCKWELL

C O R P O R A T I O N

EXECUTIVE OFFICES 347 MADISON AVENUE NEW YORK CITY



DREADNAUGHT T I R E S



THE DREADNAUGHT TIRE & RUBBER CO
BALTIMORE, MD.

GUARANTEED 6000 MILES

CHARLES F.U. KELLY, INC.
SALES DEPARTMENT
1834 BROADWAY
NEW YORK



Packard



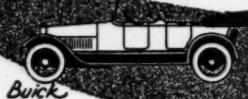
Pierce-Arrow



Peerless



White



Buick



Studebaker



Kissel Kar



Moline-Knight



Auburn



Essex



Hudson



Chandler



Dodge



Oldsmobile



Hupmobile



Chalmers



Ford Government Ambulance



General Motors Government Ambulance



Standard Equipment

GABRIEL SNUBBERS

Make Your Car Ride Easier and Last Longer

America's Foremost Cars

are either standard-equipped with Gabriel Snubbers at the factory or have holes in the frame ready to receive them.

When even the best of all cars use Snubbers to increase riding comfort and prolong life, then

—its's proof that every car ought to have Snubbers.

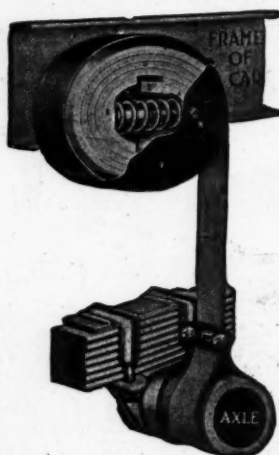
GABRIEL MFG. CO.

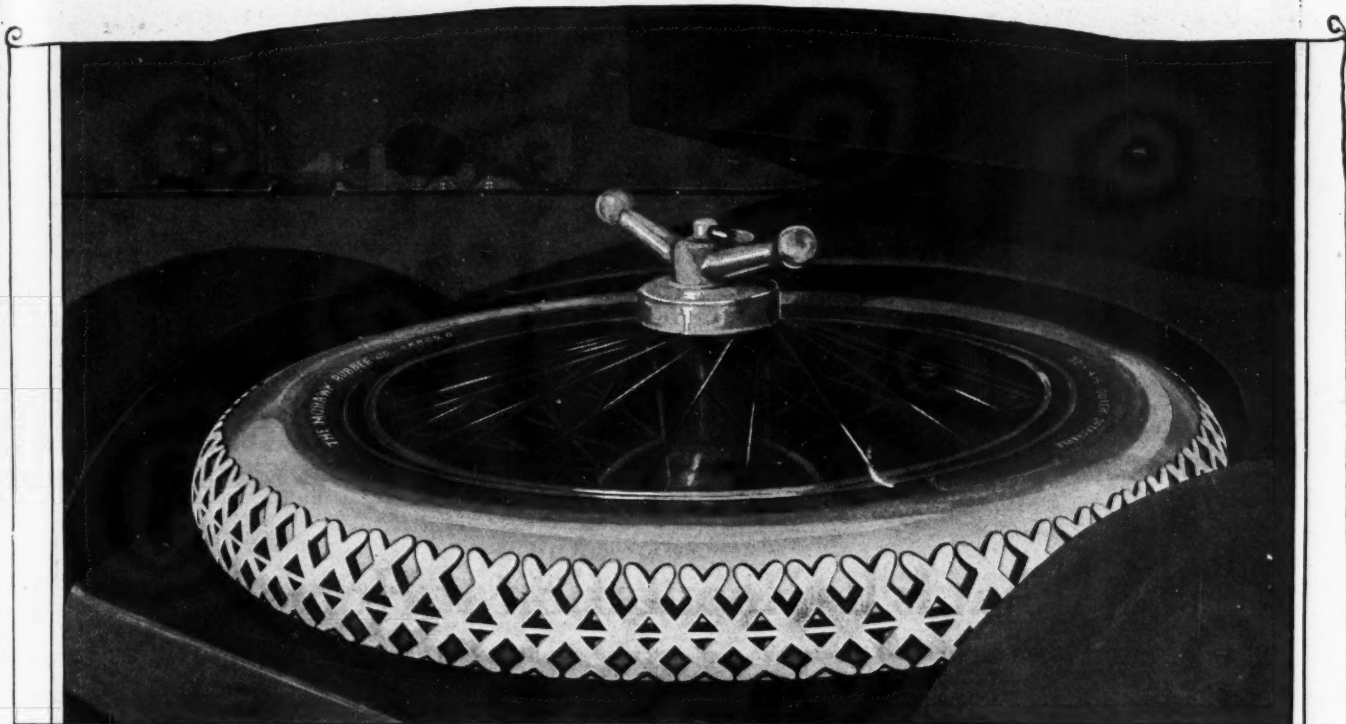
1415 E. 40th St.

CLEVELAND, O.



GABRIEL SNUBBERS keep the car from bouncing just as easily as the boy holds the bull—it's the COIL that does the trick.





Winning the Best Trade with Mohawks

How it Profits Mohawk Dealers

"Mr. Richards, I want you to try a Mohawk Tire because I know you are going to be so well satisfied with it that you will use Mohawks exclusively.

"I can back Mohawks with my personal recommendation because I know I am offering you definite, tangible advantages—not mere talk and claims.

"In most sizes of Mohawk Tires you will find an extra ply of fabric. You will get more rubber for your money than you will in other tires—as much as ten pounds more if you buy a Mohawk Cord. I can prove this on the scales if you care to have me.

"I know how the Mohawk people build their tires—out of pure high-grade materials and plenty of them—not an ounce of shoddy or reclaimed rubber. They are honestly and carefully built through and through.

"I know you will get so much extra mileage from a Mohawk Tire that it will surprise you."

These are statements you can sincerely and truthfully use in selling Mohawk Tires.

Of course, they will win for you the best and most profitable class of trade in your community—a trade which will not only yield a larger immediate profit but which will also insure the permanency of your business in the future.

*If That is the Sort of Business You are Seeking, We
Suggest That You Inquire for Our Dealer's Proposition*

MOHAWK RUBBER COMPANY, AKRON, OHIO

New York

Boston

Atlanta

Chicago

Kansas City

Dallas

San Francisco

MOHAWK "Quality" TIRES

HAND MADE

HAWKEYE

MOTOR TRUCKS

What Is Its Reputation at Home?

If you want real information, find out what the users of a line of trucks think of them in the city where they are made.

Hundreds of Hawkeyes are in use in Sioux City and vicinity. If they were not making good, we could not hide the truth from this community.

One large firm in Sioux City wrote us:

"We have been using our 1½-ton Hawkeye Truck for over a year now and it is giving us very satisfactory service. For a truck of this capacity we do not think it can be equalled. We do not hesitate to recommend it to any prospective buyer."

Hawkeye Trucks are equipped with such Quality Tested Units as Buda Motor, Clark Internal Axle, and Fuller Transmission.

In addition, we make over 170 parts in our own factory.

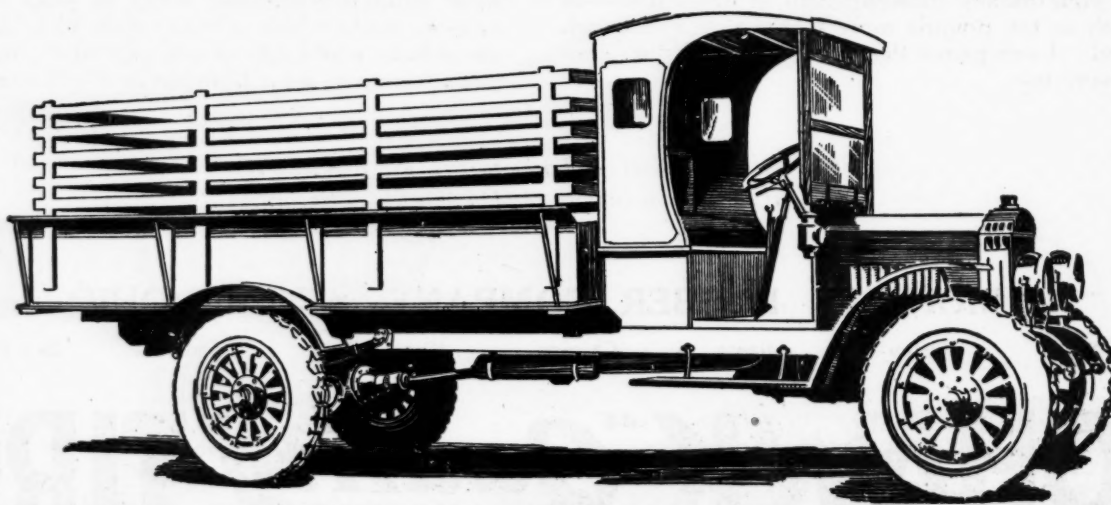
HAWKEYE TRUCK CO.

Manufacturers of Good Trucks Sold at a Fair Price

R. A. BENNETT, President

616 Sixth Street

SIOUX CITY, IOWA



Strom

BEARINGS

RIGID adherence to these high standards of quality and service which have made Strom Bearings standard equipment wherever a shaft turns has resulted in the unusually heavy demand from all parts of the country now being made upon us for Strom equipment. In many lines of industry Strom Bearings are multiplying power and reducing its cost by practically eliminating power destroying friction.

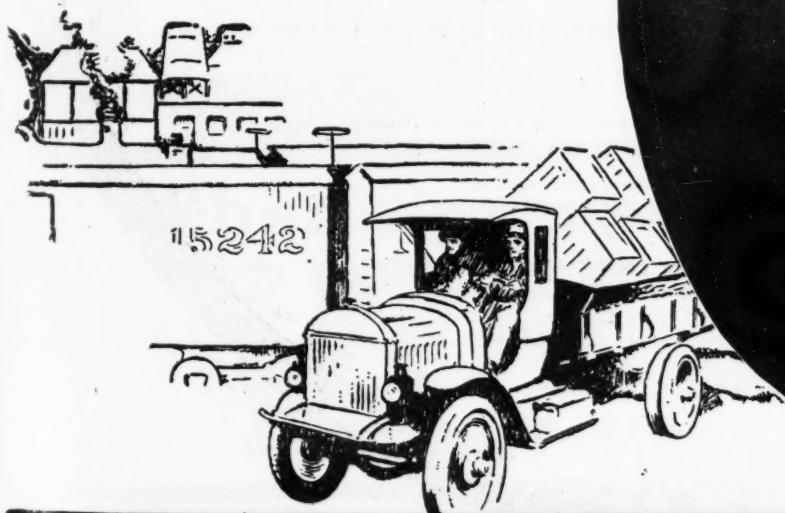
U.S. Ball Bearing Mfg. Co.

(Conrad Patent Licensee)

Palmer Street and Kolmar Avenue, Chicago, Illinois



(35)





GILL

The Perfect One Piece Piston Ring

"Here is the ring I am going to put on your pistons. The Gill Piston Ring, the best made, and here is the reason why it is the best. Look at the joint."

The dealer or garage man does not have to ask the motorist to look at a Gill Ring twice for him to realize that he is getting the best on the market. You don't have to argue about the Gill Ring, one look at the double step interlocking joint is enough. You can see why it allows an expansion of from $\frac{1}{8}$ " to $\frac{3}{16}$ " before any loss of compression occurs. This allows the ring to adjust itself to worn, oversize or out of round cylinders within reasonable limits. If you don't carry the Gill Piston Ring now is a good time to get aboard the band wagon.

Send for the new Gill Piston Ring Size Directory, complete, convenient and full of just the information you need. It is free to the trade.

Dealers—Ask your jobbers about them
Jobbers—Write to us for information

The Gill Manufacturing Company

351 West 59th Street, Chicago, Illinois

Sole Foreign Agents:
 AUTOMOTIVE PRODUCTS CORPORATION
 Woolworth Building, New York, N. Y.

Whenever a VULCAN Spring is sold
(and that happens some 50,000
times a month) two things occur:

The Buyer receives guaranteed
service and satisfaction in full
measure —

The Dealer makes a substantial
profit, and scores one more
permanent customer and friend.

JENKINS VULCAN SPRING CO.

Factory: RICHMOND, IND.

Branches:

Atlanta, Ga.	Kansas City, Mo.
Boston, Mass.	Minneapolis, Minn.
Dallas, Tex.	Reading, Pa.
St. Louis, Mo.	



When Springs Break, put on

VULCAN
QUALITY
The Replacement Spring



*You Know
They See*

*Your Customers
Know They Excel*

**Made for a purpose—
Consistent Ignition**



Ask Your Jobber for the Plug in the Yellow Checkerboard Box

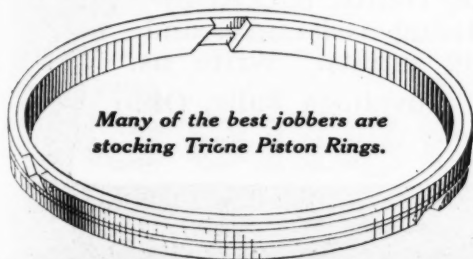
TRIÖNE

The Three-Piece Snap Piston Ring



Two sturdy square cut rings supported by an inner ring of angle beam construction—the construction used in heavy structural work when great strength is needed. The three rings are assembled, ingeniously pinned, to function as a single ring.

True circular expansion cannot be obtained in a ring or less than three parts. So the Triöne is a three-piece ring with all gaps effectively sealed—and because of the angle beam inner ring the Triöne has all the strength possible in any ring and is as easy to install as a snap ring.



Many of the best jobbers are stocking Triöne Piston Rings.

SALES DEPARTMENT

BAILEY-DRAKE CO., Inc.

1120 So. Michigan Ave.

CHICAGO, ILL.

AND ALL BRANCHES

Date.....

BAILEY-DRAKE CO., Inc.
1120 S. Michigan Ave. CHICAGO, ILL.

Send full information and prices on Triöne Piston Rings. Also a copy of your booklet, "Why a Piston Ring"

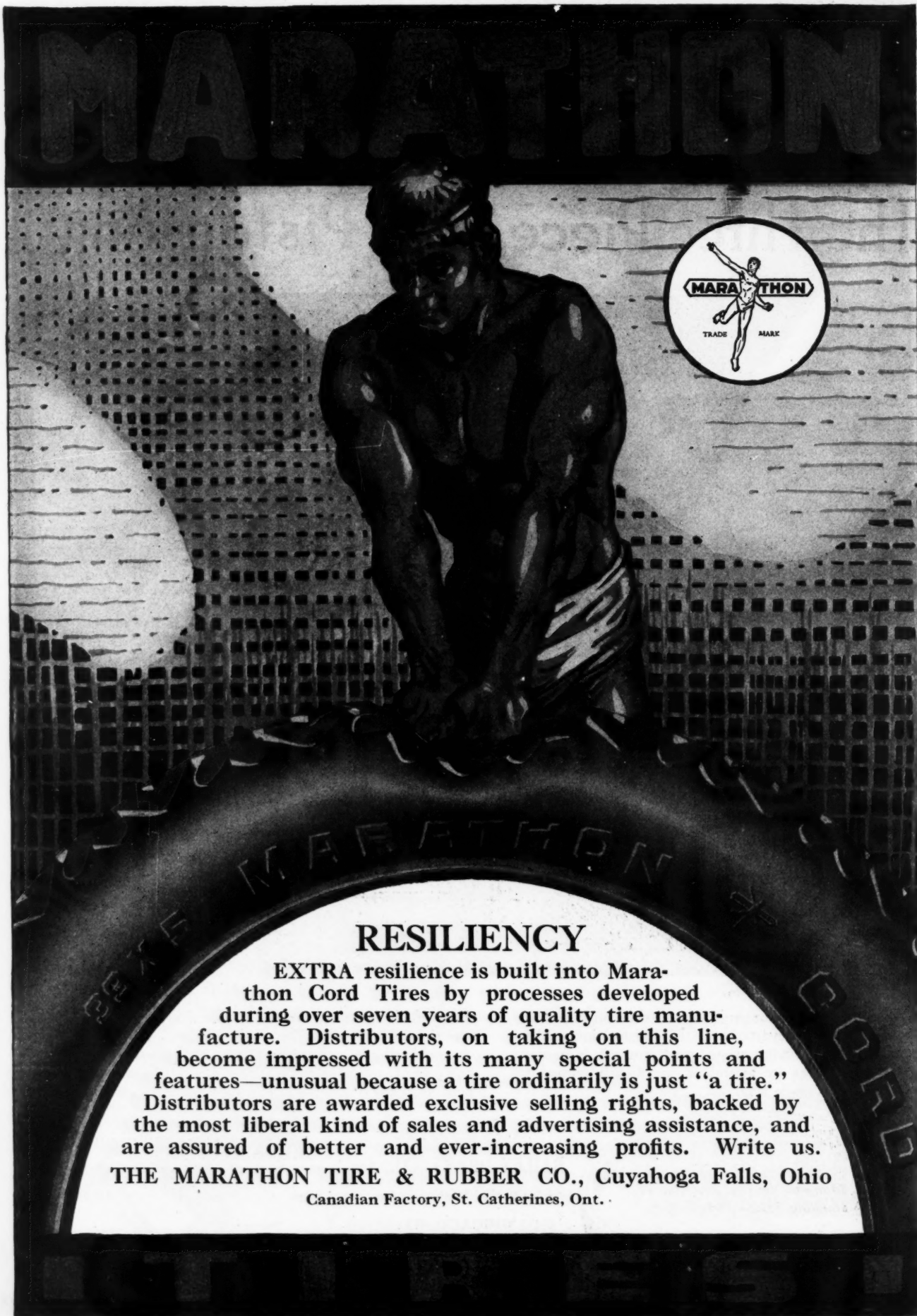
Business.....

Name.....


MA10-16-9 Street.....

Town.....

State.....



MARATHON

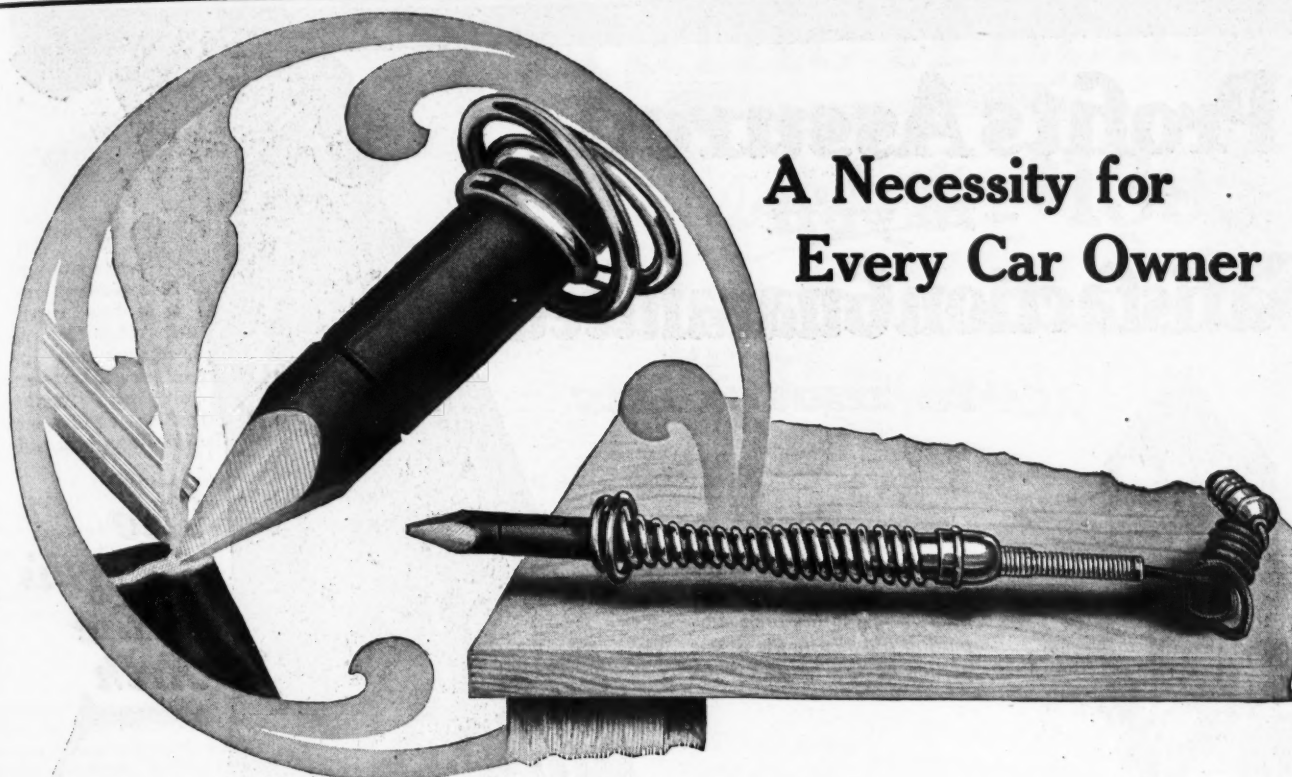


RESILIENCY

EXTRA resilience is built into Marathon Cord Tires by processes developed during over seven years of quality tire manufacture. Distributors, on taking on this line, become impressed with its many special points and features—unusual because a tire ordinarily is just “a tire.” Distributors are awarded exclusive selling rights, backed by the most liberal kind of sales and advertising assistance, and are assured of better and ever-increasing profits. Write us.

THE MARATHON TIRE & RUBBER CO., Cuyahoga Falls, Ohio
 Canadian Factory, St. Catharines, Ont.

TIRE RESILIENCY



A Necessity for Every Car Owner

The G-E Electric Soldering Iron Heats quickly—stays hot—always on the job

EVERY car owner needs a good soldering outfit. There are countless little jobs about a car which can easily be taken care of by such an outfit, saving many a garage bill. The price of one such job will frequently pay for one of these irons.

An electric soldering iron is always hot a few minutes after the current is turned on and *stays hot* until the job is finished no matter how long it takes to get at the spot where the repair is needed. Of course no torch or furnace is needed and the temperature of the iron point is always *exactly right* for work.

Remember the G-E Soldering Iron attaches to any lamp socket and is ready for work in a few minutes.

Ask your electrical dealer or write us for prices.

**General  Electric
Company**

General Office
Schenectady, N.Y.

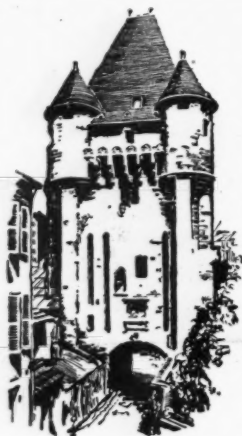
Sales Offices in
all large cities.

Profits Assured

-to you

Satisfaction Guaranteed

-to motorists



The tower of an old castle at Nevers, France, dating from the days of Charlemagne. Note the arch supporting practically the major portion of the tower.

The Strength's In The Arch

There is no greater assurance of profit than a growing number of satisfied customers. And there is no greater assurance of a growing number of satisfied customers than by offering them Tuthill Titanic Springs.

Tuthill Titanics aren't just "different" from ordinary springs—they're better—built on a sounder, surer principle. Instead of a hole or nib in the center where the shock and jolt wears a spring hardest—Tuthill Titanic Springs are smooth and whole, but arched to withstand strain.

A man who buys a Tuthill Titanic Spring from you will never buy another spring anywhere else. The constant remembrance of that satisfaction will bring him back—and his friends, too.

Tuthill Titanic Springs are always sold with a positive guarantee—**Guaranteed Forever** against breakage in the center—where nine out of ten springs break; and guaranteed for one year against defective service or breaks of any character. See Chilton's or Auto Trade Directories for complete list of dealers.

Send for the Free Book

Enables you to quote on every type of Tuthill Titanic Spring for every type of passenger car or truck—and tells where to get it nearest you. Do it today.

TUTHILL SPRING COMPANY

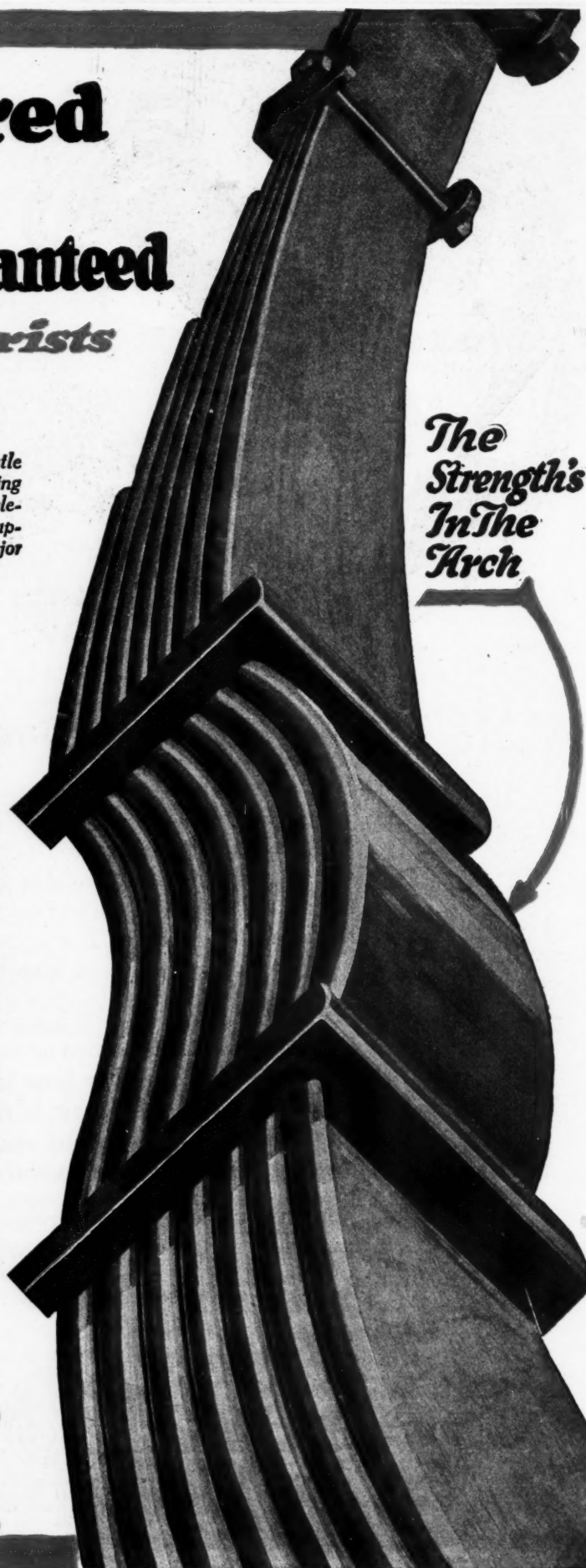
(Established 1880)

760 W. Polk Street, Chicago

Tuthill Titanic Springs now made for Fords
Price \$6.00



A handsome sign and spring rack free for your show room under our special proposition



"Horse Sense"



There were always more horses used commercially than for pleasure and it is prophesied that the motor truck will replace the wagon faster than pleasure cars replaced buggies, especially on the farm—because trucks are far more profitable and economical.



The amount of capital invested in the automobile industry is greater by \$250,000,000 than the capitalization of all the National Banks in the country.



Cheaper transportation is guaranteed by the 40,000 miles of new roads being planned by Government and State authorities and by the practically unlimited production of the lowest priced 4,000-lb. capacity truck in the world. by the Traffic Motor Truck Corporation. Good Trucks on good roads is a consummation devoutly to be wished.



The Traffic is the lowest priced 4,000-lb. capacity truck in the world. Built of standardized units.



Traffic Specifications

Red Seal Continental $3\frac{3}{4} \times 5$ motor; Covert transmission; multiple disc clutch; Bosch magneto; 4-piece cast shell, cellular type radiator; drop forged front axle with Timken roller bearings; Russel rear axle, internal gear, roller bearings; semi-elliptic front and rear springs; 6-inch U-channel frame; Standard Fish tires, $34 \times 3\frac{1}{2}$ front, 34×5 rear; 133-inch wheelbase; 122-inch length of frame behind driver's seat; oil cup lubricating system; chassis painted, striped and varnished; driver's lazy-back seat and cushion regular equipment. Pneumatic cord tire equipment at extra cost.

Chassis \$1395
f. o. b. St. Louis



Notice to Dealers

It is Traffic policy to make direct connections in every city, town and village throughout the United States. Wire for territory you want and if open come to the factory and see the Traffic produced and perform.

Traffic Truck

4,000 LBS. CAPACITY

This Means
Something

\$1395

WESTERN UNION TELEGRAM

NEWCOMB CARLTON, PRESIDENT GEORGE W. E. ATKINS, FIRST VICE-PRESIDENT

CLASS OF SERVICE SYMBOL	
Telegram	Blue
Day Letter	Blue
Night Message	White
Night Letter	White

CLASS OF SERVICE SYMBOL	
Telegram	Blue
Day Letter	Blue
Night Message	White
Night Letter	White

RECEIVED AT COMMERCIAL BLDG., 514 OLIVE ST., ST. LOUIS, MO. ALWAYS OPEN

446SP 189 COLL NL 1/84

B SEATTLE WASH 1

TRAFFIC MOTOR TRUCK CORP

638- \$3.52 STLOUIS MO

IN APPRECIATION OF THE TRAFFIC TRUCK ACCOUNT AND FURTHER APPRECIATION OF EFFORTS TO PART OF TRAFFIC MOTOR TRUCK CORPORATION WE TAKE THIS OPPORTUNITY TO SAY TO YOU THAT WITHIN THE SHORT SPACE OF SIXTY DAYS WE HAVE ACTUALLY DELIVERED SIXTY TWO TRAFFIC TRUCKS AND HAVE SOLD ABOUT ONE HUNDRED AND WE HAVE UNDER CONTRACT WITH DEALERS CLOSE TO ONE HUNDRED FIFTY WHEN WE TOOK ON THE CONTRACT FOR TRAFFIC TRUCKS IN STATE OF WASHINGTON AND IDAHO WE WERE VERY MUCH IN DOUBT AS TO OUR

RECEIVED AT COMMERCIAL BLDG., 514 OLIVE ST., ST. LOUIS, MO. ALWAYS OPEN

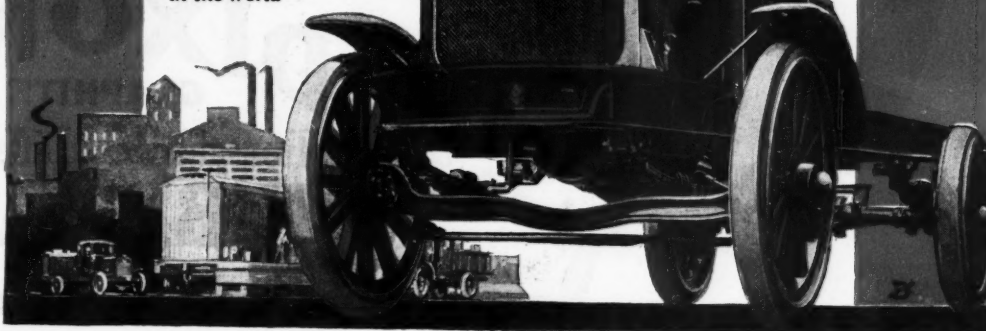
Sheet 2 - 100

ABILITY TO SELL THE NUMBER CONTRACTED FOR WITHIN LIFE OF THE CONTRACT TWO MONTHS HAS ELAPSED AND WE FEEL IT NECESSARY TO DOUBLE QUANTITY NAMED IN ORIGINAL CONTRACT WE HAVE COVERED PERHAPS VERY INEFFICIENTLY ONE QUARTER OF TERRITORY WHICH OUR CONTRACT PRESCRIBES FOR THE TRUCK IN EVERY RESPECT HAS PROVEN TO BE A TRUCK OF MERIT AND WORTH AND IT IS GIVING EXCELLENT SATISFACTION TO ALL OF THE USERS WE CONSIDER THE TRAFFIC TRUCK ACCOUNT A VERY VALUABLE ACCOUNT TO US IN FACT IT HAS LESS SALES RESISTANCE THAN ANY LINE WE HAVE EVER HAD ANY EXPERIENCE WITH. WE WILL LICK THEM ALL.

SHIELDS LIVINGOOD MOTOR COMPANY.

Traffic Motor Truck Corp.
St. Louis, U. S. A.

The Largest Exclusive Builders of
4,000-lb. Capacity Trucks
in the World





Wisconsin Is For It

We have been handling Dixon's Graphite Grease three years, and as we have not found any dissatisfied users during that period we can unhesitatingly recommend it.

We have received your co-operation in the way of advertising and sales help during all the time we had handled this material.

The Dixon line will be included again in our new catalogue, and we hope our pleasant relations may continue indefinitely.

Yours truly,

JULIUS ANDRAE & SONS CO.,
Milwaukee, Wis.

Hundreds of other letters from manufacturers, dealers and users are just as significant as this one.

Write for booklet 82-G

JOSEPH DIXON CRUCIBLE COMPANY

JERSEY CITY, NEW JERSEY

Established 1827



DIXON'S
GRAPHITE
Transmission and Differential
LUBRICANT

THERE is about as much metal in a nickel as there is in a five dollar gold piece—and there is about the same amount of material in the ordinary tire as there is in a Kelly. But when it comes to spending the nickel, or trying to get Kelly mileage out of low-priced tires, the difference becomes apparent.



The Difference Between Profit and Loss

In the sale of gasoline, speed and volume mark the difference between profit and loss. Reduce the time necessary to serve your customers, thereby greatly increasing your gasoline sales, and instead of small money on gasoline you will make a bigger profit.

WAYNE Curb Outfits point the way to a profitable gasoline business. A WAYNE pump is positive assurance to the car owner that he will get quick service, **honest measure** and **clean, filtered gasoline**. When a customer knows that, he remains a customer and boosts. That means greater volume.

By actual test WAYNE Pumps have lead the field in speed of operation. That re-acts for more profit in two ways—it gives the customer better service and permits the operator to do productive work in the meantime.

Added to these points are the following features that make WAYNE Curb Outfits profit builders for your garage: gear driven meters, continuous forward motion of handle, push button quantity stops, cylindrical sliding housing counterbalanced, six inch clock-like discharge register, graduated computing scale, and a two year guarantee.

Write for Bulletin 276 MA and complete information

WAYNE OIL TANK & PUMP CO.

518 Canal St., Fort Wayne, Ind.

Wayne

Honest Measure pumps



The Beauty and Quality of Pasco Wire Wheels Is the Foundation of Their Popularity

The desire on the part of the majority of motorists for greater attractiveness and individuality in their cars is one of the big moving factors in the automobile trade. It is responsible for a big part of the demand for Pasco Wire Wheels.

More Pascos, we have found, are sold on account of their handsome appearance and superior quality, than because of any of the exclusive mechanical features which make Pasco Wire Wheels the engineering triumph they are daily proving themselves to be.

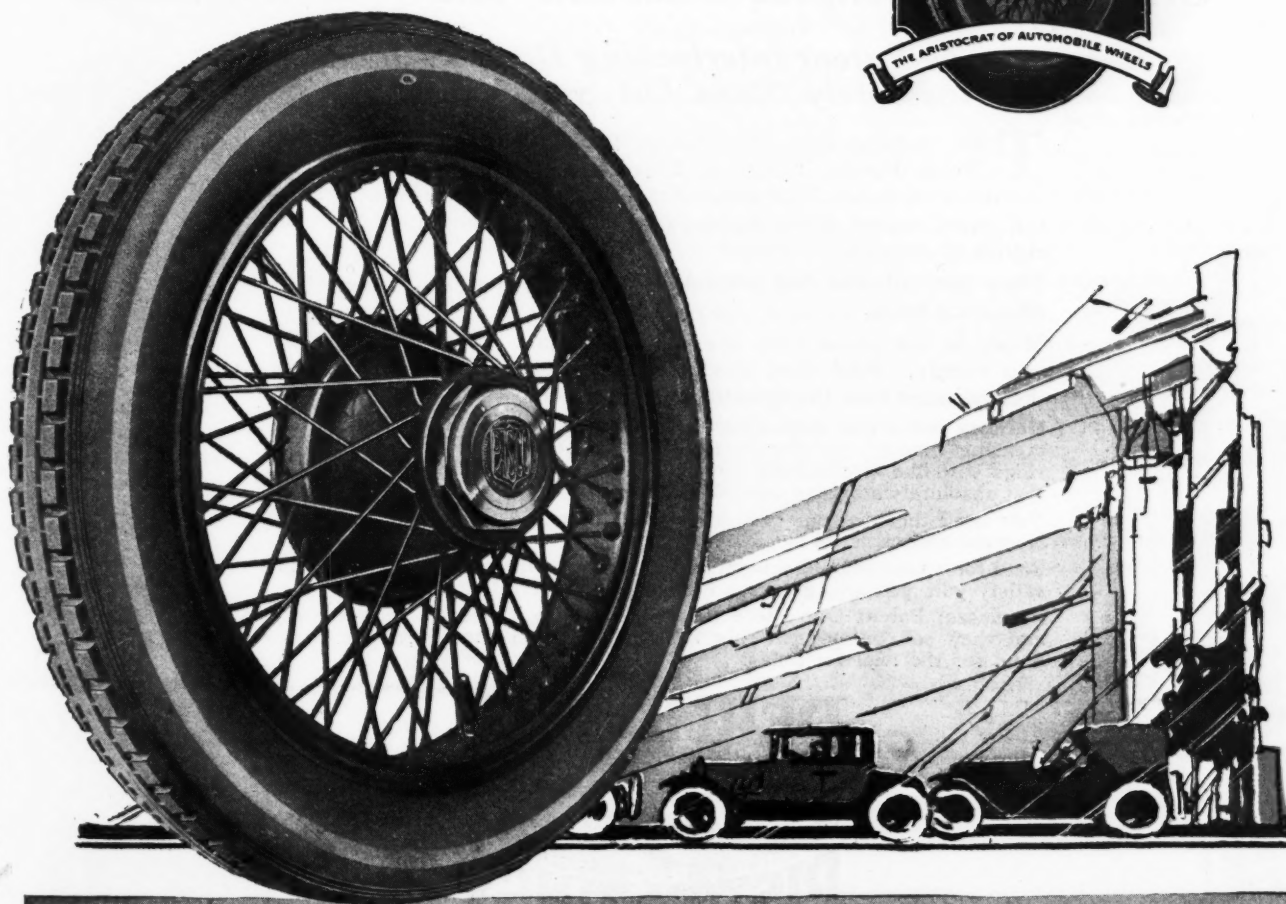
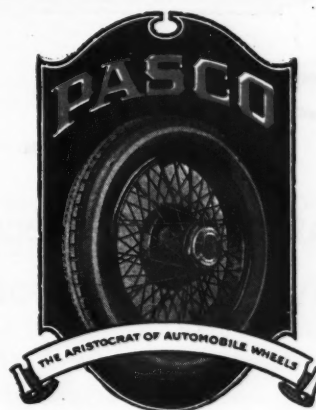
Yet these exclusive mechanical features should not be lost sight of, for they secure to users of Pasco Wire Wheels a maximum of safety, economy and all-around convenience.

Whether you are a car manufacturer, a dealer or a car-owner, it will pay you to know more about Pasco Wire Wheels.

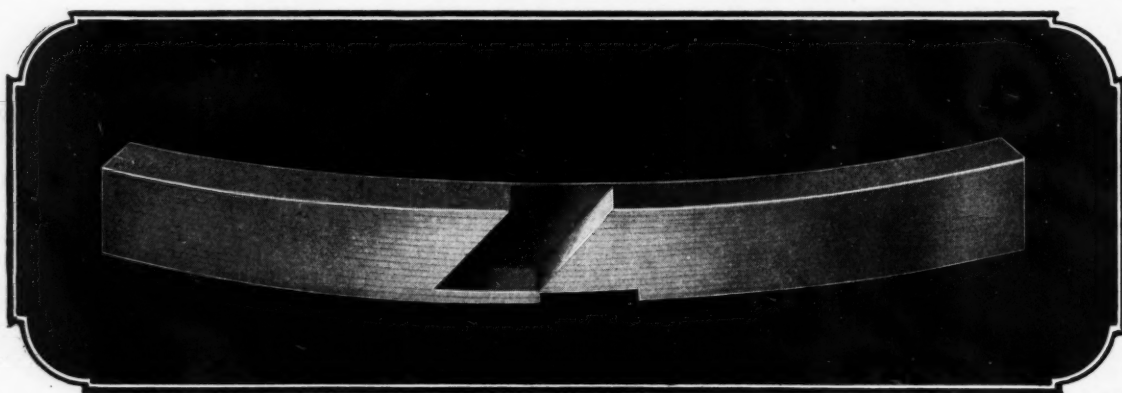
National Wire Wheel Works, Inc.
416-417 Book Bldg., Detroit, Mich.

Plant No. 1—Geneva, N. Y. Plant No. 2—Hagerstown, Md.

Montreal, Canada, The Northern Electric Co., Ltd.



PASCO WIRE WHEELS



PERMASEAL

**Patent One Piece, Oil and Gas Tight Piston Rings
Give Dealers Longest Discounts and Quickest Sales**

*The Patent Interlocking Dovetail Joint
Absolutely Stops Oil and Gas Leaks*

THE outstanding characteristic of Permaséal Patent One Piece Piston Rings is that it is *mechanically impossible* for them to leak. The scientifically designed interlocking dovetail joint makes them light proof even with the gap open an eighth of an inch.

They put unbelievable pep and power into any motor and their efficiency lasts.

Made in one piece, they are easy to install. They seat quickly and evenly. And they absolutely pack two joints—the wall of the cylinder and the groove of the piston.

Garages and repair men all over this country are feeling the great increasing demand for Permaséal Patent One Piece Piston Rings—the rings with the interlocking Dovetail Joint and the Quick-seating Finish that absolutely stop gas and oil leaks.

You need them. Your customers want them. Everybody is trying to stop gas and oil leaks in motors.

Send for a trial set. Try them in any kind of a motor and if they do not satisfy you, you will get your money back cheerfully.

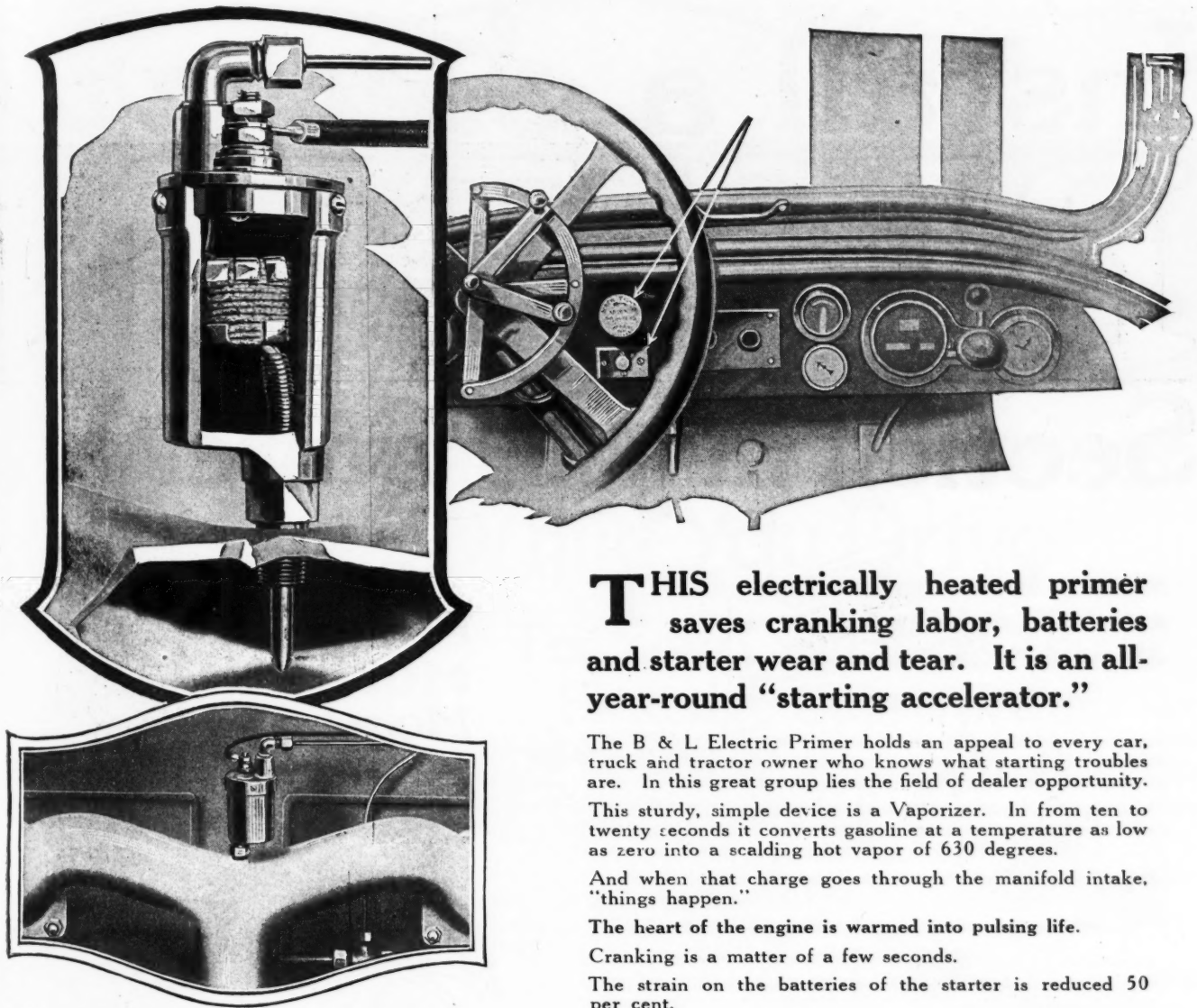
Permaséal Patent One Piece Piston Rings pay Dealers a bigger profit and they sell better—two big reasons why you should feature them. Send for the trial set today.



GRUNDY MANUFACTURING CORPORATION

690 Meldrum Avenue

Detroit, Michigan



DEALERS—

We want you to use our demonstrating stand right on your counter. Show your trade the actual super-heated vapor rushing from the vents. You operate with the actual switch and plunger and sell your customer before you put it on his car. Write for the details of this money-making service device and how to get the stand free.

THIS electrically heated primer saves cranking labor, batteries and starter wear and tear. It is an all-year-round "starting accelerator."

The B & L Electric Primer holds an appeal to every car, truck and tractor owner who knows what starting troubles are. In this great group lies the field of dealer opportunity.

This sturdy, simple device is a Vaporizer. In from ten to twenty seconds it converts gasoline at a temperature as low as zero into a scalding hot vapor of 630 degrees.

And when that charge goes through the manifold intake, "things happen."

The heart of the engine is warmed into pulsing life.

Cranking is a matter of a few seconds.

The strain on the batteries of the starter is reduced 50 per cent.

Wear and tear on the starter is materially reduced.

There can be no carburetor flooding.

And that old hood raising, petcock priming nuisance is gone forever.

The throw of a switch and the pull of a plunger (both on the dash) heat the coil to faint cherry-red and vaporize the fuel within the coil.

AUTO DISTRIBUTING CO.
Plainfield **New Jersey**
 New York Office 1834 Broadway

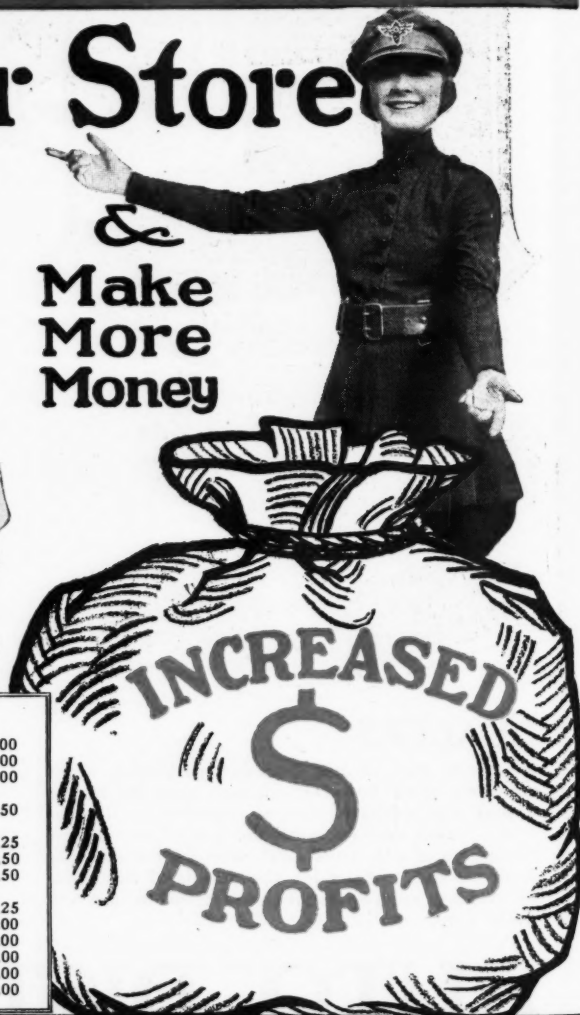
ELECTRIC B PRIMER
NOT A PUMP BUT A HEATING VAPORIZER

Install a *Stewart* BIG TEN

Section in your Store



&
Make
More
Money



The Stewart "Big Ten"

STEWART Speedometer	\$25.00
Special Ford Models	\$11.75 to 20.00
STEWART V-Ray Searchlight	6.00
STEWART Warning Signal, Hand-Operated—Model 114	4.50
STEWART Warning Signal, Hand-Operated—Model 151	3.25
STEWART Warning Signal, Motor-Driven	7.50
STEWART Vacuum System	12.50
STEWART Spark Plug, New One-Point Models	1.25
V-Ray (Four Points)	1.00
STEWART Autoguard	12.00
Ford and Chevrolet Sizes	10.00
STEWART Hub Odometer	10.00
WARNER Auto-Meter	50.00

HERE'S a real business-building idea! Many dealers put in a "Stewart 'Big Ten' Section" at the instance of our suggestion made some months ago. They report that, since its inception, their sales activity in Stewart Custom-built Necessities has increased considerably. **Because—**

- (1) It "cashes in" most effectively on our national advertising, which features the "Big Ten" idea strongly. (2) It calls motorists' attention to the entire Stewart line. It thus makes many sales you would not otherwise get.

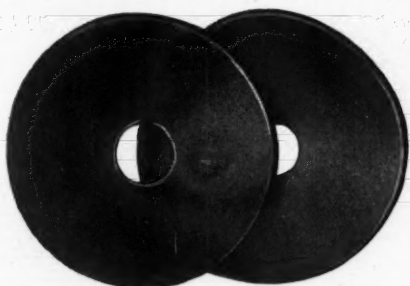
Write us at once for information as to how YOU, too, can carry out this plan and **MAKE MORE MONEY**

Stewart-Warner Speedometer Corporation, Chicago, U. S. A.

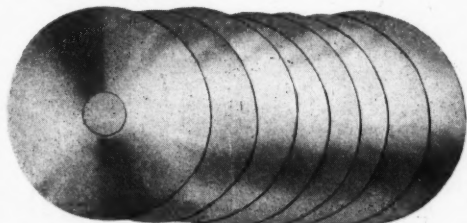
A Nation-wide Chain of Service Stations



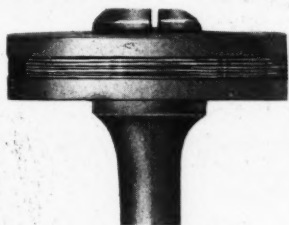
A Valve Seat Carbon Remover at Work While You Drive



Two high-carbon plates between which eight paper fine steel discs, shown immediately below, are pressed together under great pressure.



These highly tempered steel discs furnish the flexation as the valve opens and closes.



The assembly before the shaping takes place.



The finished valve ready for installation.

Tell Your Customers About Flexedge Construction

There is nothing mysterious about FLEXEDGE construction. The merits of this construction are quite apparent even to the average layman. The flexation is secured from eight paper-thin, highly tempered, spring steel discs, which are pressed together and held rigidly between two high-carbon plates forming almost a composite piece of metal except at the outer edges of the eight discs where the flexation takes place.

This flexation is very minute, in fact, too minute to be called a vibration, yet sufficient to remove the tiny flecks of carbon which collect after each explosion.

Flexedge valves are installed just like all other valves.

Flexedge Valves are carried in stock by the following Jobbers and Representatives

Federal Appliance Corp.....	1966 Broadway, New York
Jos. R. Tripp.....	909 S. Grand Ave., Los Angeles, Cal.
Reinhard Bros., Inc.....	Minneapolis, Minn.
Kant Break Spark Plug Co.....	297 Madison Ave., Memphis, Tenn.
Motor Car Supply Co.....	1451-5 Michigan Ave., Chicago
Chicago Automobile Supply House.....	1349-53 Michigan, Chicago
The Gibson Company.....	Indianapolis, Ind.
Repass Automobile Co.....	Waterloo, Iowa
United Motor Company.....	Houston, Texas

Flexedge Prices

Ford	\$0.50 ea.	Oakland Six	\$1.25 ea.
Chevrolet75 ea.	Franklin Model B.....	2.00 ea.
Buick D44	2.00 ea.	Saxon Six	1.25 ea.
Buick D45	2.00 ea.	Elgin Six	1.25 ea.
Buick D35	1.25 ea.	Grant Six	1.25 ea.
Oldsmobile 37	1.25 ea.	Oldsmobile 45	1.25 ea.

SELF-SEATING VALVE CO.
706-8 Townsend St., Chicago, Ill.

The Imprint FLEXEDGE Appears On the Head of All Genuine FLEXEDGE Valves

DEALERS— Every FORD Truck in Your Territory Is an H. & D. Prospect

Besides "ironing the roads" for thousands and thousands of Ford passenger cars, H. & D. Shock Absorbers are protecting fleet after fleet of Ford trucks from excessive road shocks—the wear and tear that ruins.

In addition to easy riding, H. & D. Shock Absorbers protect the motor, prevent springs and axles from breaking, make possible greater mileage, and insure a longer life for the truck in general.

Then again the matter to be delivered is often of a breakable nature, demanding protection against jarring, which a good pair of shock absorbers alone can accomplish.

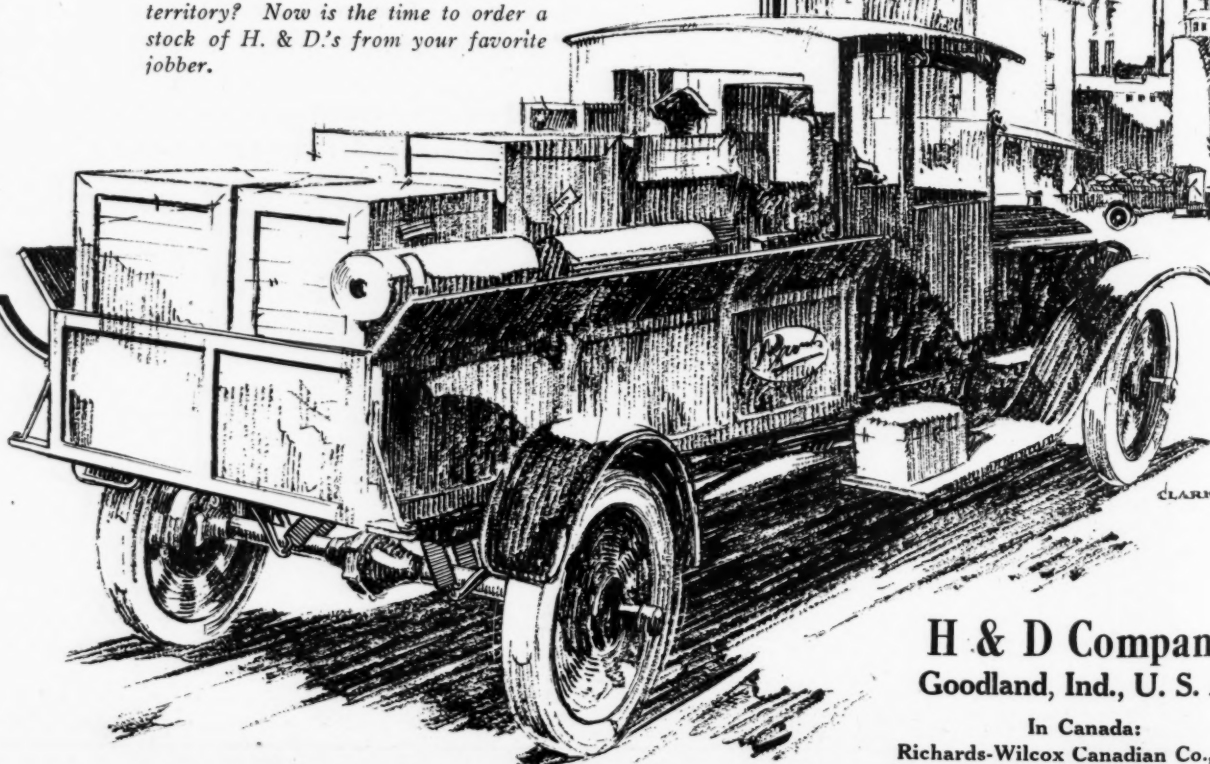
Truck owners who are using H. & D. Shock Absorbers insist that their H. & D. equipment plays an important part in keeping their vehicles in service instead of in the repair shop.

DEALERS—Have you ever figured out how easy you can sell H. & D. Shock Absorbers to Ford truck owners in your territory? Now is the time to order a stock of H. & D.'s from your favorite jobber.

H&D

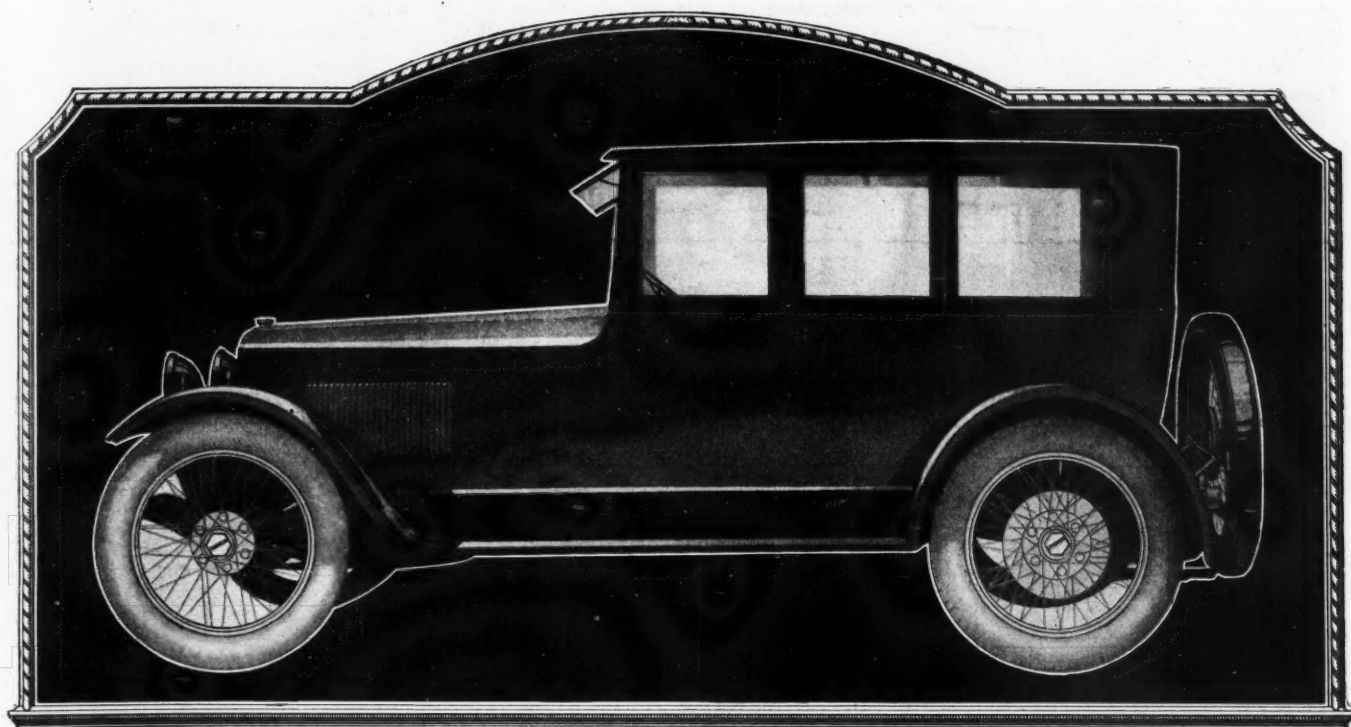
SHOCK ABSORBERS
Single or Twin Arm

"THEY IRON THE ROADS"



H & D Company
Goodland, Ind., U. S. A.

In Canada:
Richards-Wilcox Canadian Co., Ltd.,
London, Ont.



Announcing the Inclosed Models of the
AUBURN Beauty-SIX

THE inclosed models of the AUBURN Beauty-SIX are characterized by the same verve and grace of line which won such marked favor for the Beauty-SIX touring models. Here again, you find daring mellowed by experience, conscious artistry tempered by discretion. Here again, you find ample room for luxurious comfort rather than mere riding space. In elegance of appointments and fittings these new AUBURN Beauty-SIX models eminently satisfy the most discriminating.



Auburn Model 6-39-H Touring	\$1,695
Auburn Model 6-39-K Tourster	1,695
Auburn Model 6-39-R Roadster	1,695
Auburn Model 6-39-Sedan, Five-Passenger	2,475
Auburn Model 6-39-Coupe, Four-Passenger	2,475

*Auburn inclosed models for Fall and Winter are
 now being exhibited by Auburn representatives*

AUBURN AUTOMOBILE COMPANY, AUBURN, INDIANA
Automobile Engineers for Twenty Years

VOTE FOR
 GOOD ROADS

Preserved Power

of Endurance
Provides
Economy

GILLETTE SAFETY



A Bear
for Wear

Gillette Chilled Rubber Process

Perishable merchandise—fruits, meats, vegetables—is stored away in cold storage warehouses for the purpose of preservation. For the same purpose, for the same reason—preservation—Gillette Tires and Tubes are produced with Gillette Chilled Rubber Process. It toughens rubber as iron is toughened by conversion into steel. It acts as a preservative against the inclemencies of the weather—heat, cold and dampness. It stores up a surplus of endurance that is not accessible to the debilitating effects of the elements—strength that is converted into mileage—and mileage only.



Equip one wheel of your car with a Gillette—the other three with any other make you choose—the mileage result will demonstrate Gillette economy.

Gillette Rubber Co.

General Sales Office: 1834 Broadway, N.Y. Factory: Eau Claire, Wisconsin

Gillette

TIRES AND TUBES

Are You Selling It Yet?

Every dealer in this country knows the demand for a frozen radiator preventive—a product that will positively do the work **without any injurious effects.**

You now have the chance of selling a product that has proved successful in every case where it was tested, and it has been tested under severest winter conditions.

We are selling G. & F. FREEZE-NOT under a positive and definite guarantee to prevent a frozen radiator in the severest winter weather and to do it without injuring rubber, copper, zinc, iron or any metal. You are also authorized to sell G. & F. FREEZE-NOT under this liberal and straight from the shoulder guarantee.

G. & F. FREEZE-NOT contains four ingredients, none of which is injurious to either rubber or metal. In fact, two of the ingredients are used to **preserve** rather than to injure metal or rubber.

Remember we not only **tell** you that G. & F. FREEZE-NOT is 100% efficient and non-injurious, **we guarantee it.** You can sell this new scientific compound to every one of your customers without any fear of a comeback. G. & F. FREEZE-NOT is positively safe under any circumstances.

If you are not selling it already, get in touch with us. Our dealer proposition is liberal and we back you up to the last ditch. Get in touch with us for the complete story.

G. & F. PRODUCTS CO.

1314 Twelfth Street

Rock Island, Ill.



COUPON

G. & F. Products Co.

1314 Twelfth St.,
Rock Island.

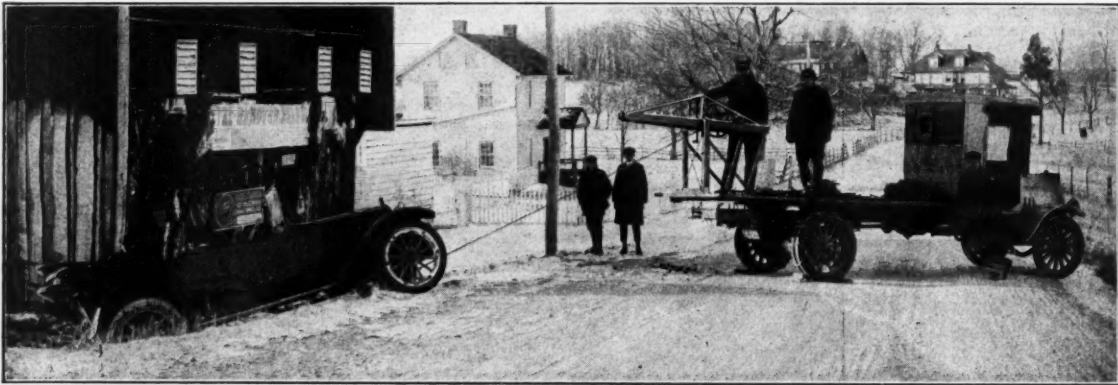
Please send me full
particulars concerning G.
& F. FREEZE-NOT and
your dealer proposition.

Name.....

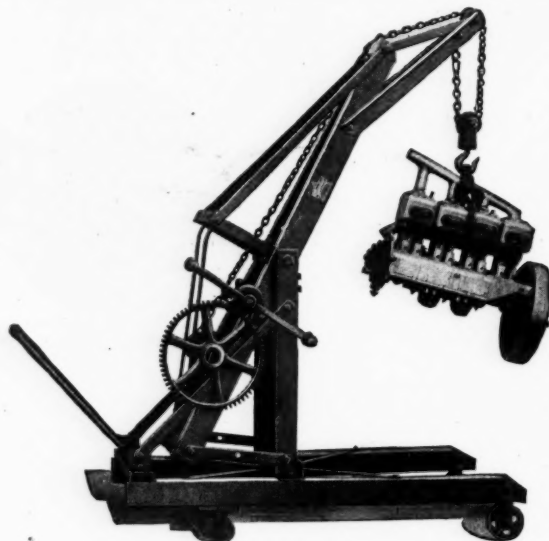
Address.....

City..... State.....

MANLEY GENERAL UTILITY CRANES



Mount on Service Cars as Wrecking Cranes



The most unique and valuable garage device ever developed.

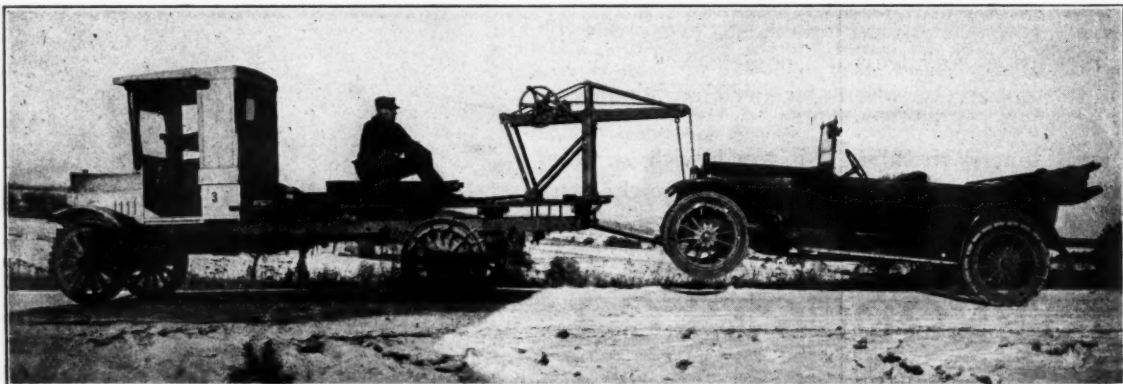
It is changed from a floor crane to a wrecking crane in five minutes.

It pays for itself by a couple of jobs.



PRESSES.
CRANES.
ENGINE
STANDS.
PORTABLE
BENCHES.
WRECKING
CRANES.
OIL—
SERVICES.

Serve as Portable Floor Cranes



Send for Descriptive Catalog

The Manley Mfg. Co.

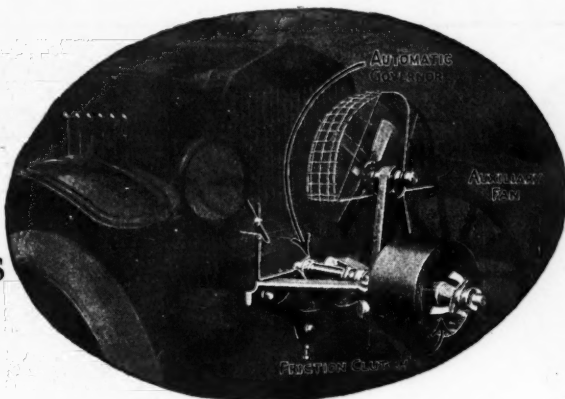
York, Penna.

DEALERS—FARMERS Look At The Profits For You

In The
New Business
It Opens and Runs

Every

McGill
AUTOPOWER
ATTACHMENT
FOR *Ford* CARS
FULLY GUARANTEED



In The Labor
and Money
It Saves From the
First

Farmers—who have been looking for a power plant to operate your Ensilage Cutter (any make), Corn Husker, Feed Grinder, Corn Sheller, Small Thresher, Wood Saw, Pumps, (all kinds), Hay Press, Root

Pulper, Fanning Mill, Roller Grnder, Concrete Mixer, Road Crusher, Cider Press, Churn, Washing Machine, Milking Machine, etc.—will find the AUTOPOWER attachment for Ford cars, fully equipped, at a moderate price, to do all the work of a 14 h.p. gasoline engine on your farm—with an automobile thrown in—for less money than the price of an ordinary gasoline engine of equal power.

Power on your farm will make your profits bigger. If you own a Ford car, MCGILL AUTOPOWER attachment can pay for itself in the first big job. Even if you do not, a MCGILL AUTOPOWER attachment plus a Ford car will pay for themselves over and over in a single season. Mail the coupon for complete information today.

Does the Work of a 14 H. P. Portable Gasoline Engine and at It's Price Throws In a Ford Car Free

Automotive dealers—how about some more profits—more legitimate business with an entirely new class of trade? How about dealing with the farmers, who know the value of power on the farm, and are anxious to have it?

The new MCGILL AUTOPOWER attachment for Ford cars has a probable buyer on every farm in your territory, not already equipped with a portable gasoline engine. And on any farms that are so equipped, there is still room for a MCGILL AUTOPOWER attachment for extra work at busy times.

MCGILL AUTOPOWER attachments are inexpensive—they cost less, plus a Ford car, than a 14 h.p. portable gasoline engine costs alone—and they do the same work.

KNIGHT METAL PRODUCTS CO.

259 EAST WILLIS AVE, DETROIT, MICH.



When you become a representative for MCGILL AUTOPOWER attachments, you have on hand a big, sure seller that pays, at a small investment, with quick turn-over.

Reach out for this new business that is waiting for you in a prosperous field where new profit-builders are gladly accepted and paid for.

**Mail the Coupon Now
It's Worth Knowing About**

Knight Metal Products Co.,
259 E. Willis Ave., Detroit, Mich.

Gentlemen:

Send me immediately complete information and free illustrated literature concerning MCGILL AUTOPOWER attachment for Ford cars.

Name.....

Address.....

Dealers check here []
Farmers check here []

"A Spare Fan Belt is as Important as a Spare Tire"



* Urge Your Customers to "Carry a Spare"

YOU CAN sell two fan belts instead of one—and display a personal interest in your customer that he will appreciate—by recommending that he "Carry a Spare."

Any car owner or driver that operates a car or truck without keeping a spare fan belt handy for emergency use is inviting serious trouble for himself and possible damage to his engine.

A fan belt cannot wear forever—even a GILMER Belt will wear out in time—but an automobile engine cannot operate without its fan belt for more than ten minutes without boiling. Just try it once yourself and see. A spare fan belt is just as important as a spare tire and a great deal easier to carry.

Advise your customers to "Carry a Spare". They will thank you for offering the suggestion.

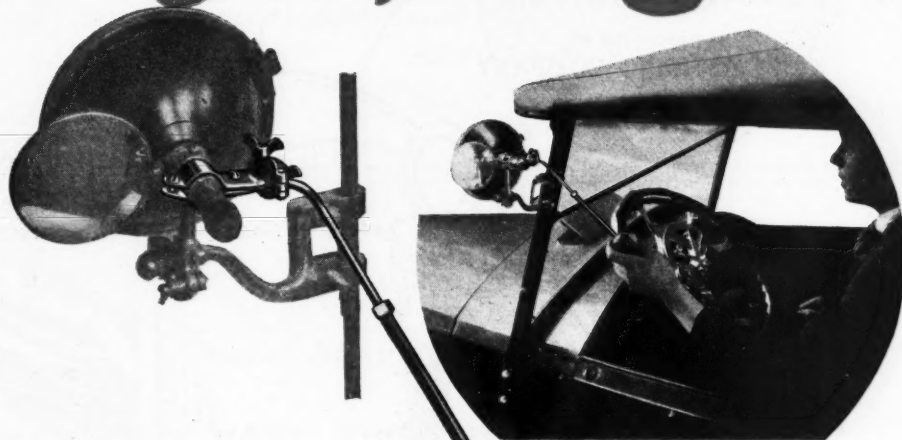
DEALERS who are not already handling the Gilmer line of fan belts are urged to ask their regular jobber about the Gilmer "Group and Carton" plan of stocking belts, or write direct.

L. H. Gilmer Co.
Philadelphia, Pa.

*During the coming year, Gilmer advertising in the Saturday Evening Post and other National Mediums will urge car and truck users to "Carry a Spare". The suggestion is a valuable one to those car users who do not already carry a spare—and will help increase belt sales for you. It's a wide-awake selling idea that every dealer should cash in on.

Gilmer
Gilmer
WOVEN ENDLESS
FAN BELTS

Added Profit On Every Spotlight Sale



The JIFFY SPOTTER

**Sells Easily Along with Every Spotlight
and to Every Spotlight Owner**

PRICE

\$2⁵⁰

**CONTROLS THE
SPOTLIGHT
AT THE
STEERING WHEEL**

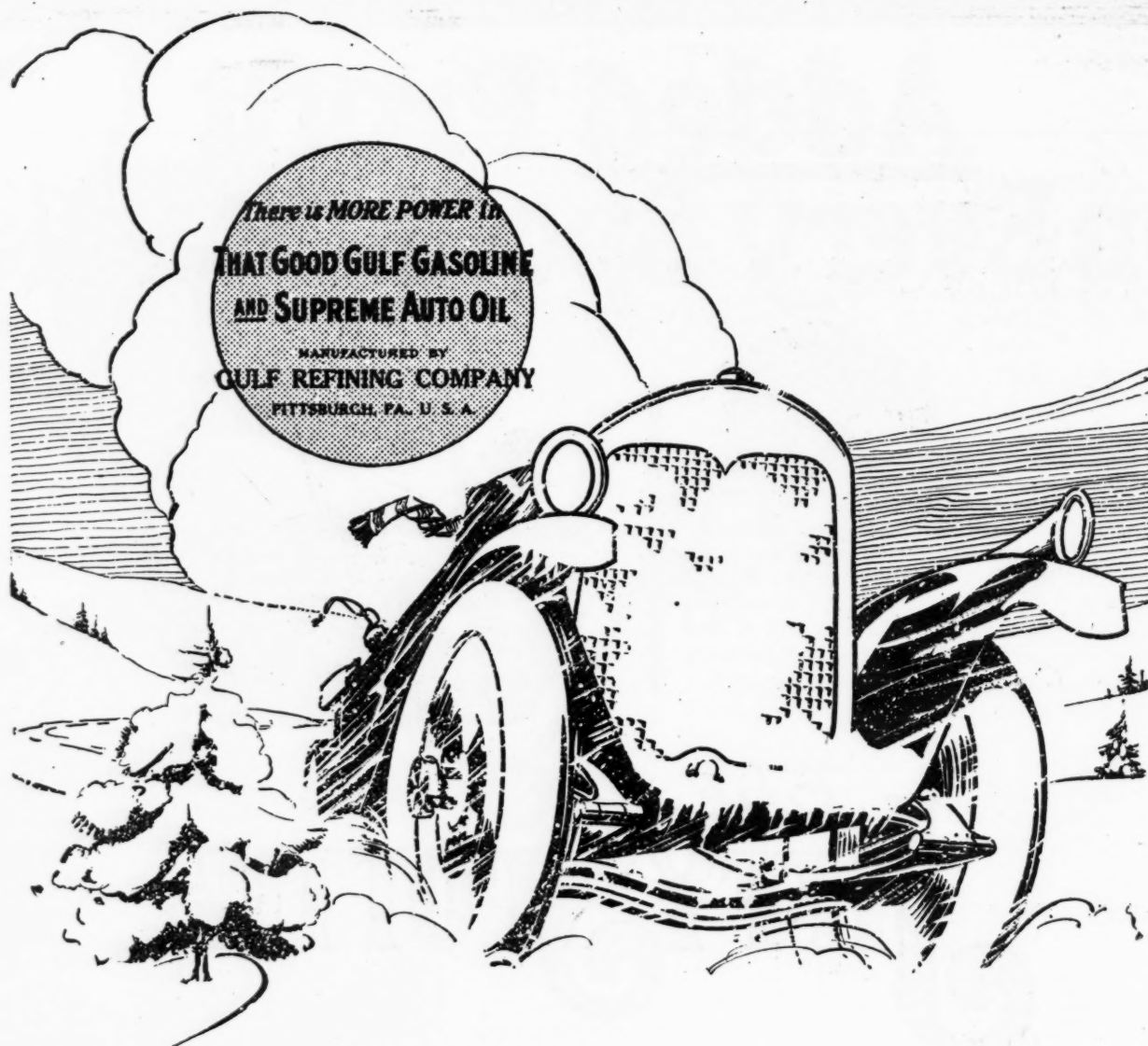
The Jiffy Spotter brings the spotlight control within easy reach of the driver, at any point close to the steering wheel. The driver's hand is never more than a few inches from the wheel, a mighty big factor of safety when passing another car, and when driving on narrow, uncertain roads.

The Jiffy Spotter really adds to the appearance of any car. All metal parts are nickel plated with jet black wooden ball at end. Ball and socket joint permits swinging control down out of the way in the day time. Fits all spotlights. Adjustable to any position. Attached by anyone. When you sell a spotlight, sell a Jiffy Spotter—and sell it to present spotlight owners also.

Write for sales proposition.

DETROIT AUTO ACCESSORIES CO., INC.

1616 N. Robey St., Chicago, U.S.A.



Anticipating a very cold Winter, it is important to plan the use of an oil that will give proper lubrication even at zero.

We are issuing a booklet containing convincing facts on this subject, explaining why many oils freeze at a low temperature, and the reason

SUPREME AUTO OIL

Flows Freely at Zero
Starts With the Engine

This Booklet Will Be Sent to You on Request

GULF REFINING COMPANY
DEPT. 72 PITTSBURGH, PA.



FOR VALUE RECEIVED the NATIONAL SURETY COMPANY, duly authorized to transact business in every state of the United States of America and the Republic of Mexico and Dominion of Canada, hereby guarantees full compliance by BERGOUGNAN RUBBER CORPORATION with its guarantee as expressed on the reverse side of this card.

This guarantee extends only to tires purchased during the period ending December 31, 1920.

NATIONAL SURETY COMPANY.

115 BROADWAY
NEW YORK

Wm B. Smith
PRESIDENT

BERGOUGNAN

BEAR-GOO-NIAN

"GIVE ME FORTY DOLLARS WORTH OF MILEAGE"

The tire user does not buy rubber, he buys miles.

If you can convince him that he will get the mileage he pays for, the sale is made.

In selling him BERGOUGNAN tires the convincing process is easy. All you have to do is point out to him: first, that the manufacturer guarantees the fabric tires for 6,000 miles and the cord tires for 8,000, and, second, THAT THE NATIONAL SURETY COMPANY GUARANTEES THAT THE MANUFACTURER WILL COMPLY WITH THIS MILEAGE AGREEMENT.

There is absolutely no room left for argument. If the Bergougnan Rubber Corporation does not make good on its promises, the National Surety Co. will.

A certificate to that effect, signed by the President of the National Surety goes with each Bergougnan tire sold.

This certainly ought to make it easy for you to sell BERGOUGNAN tires. Write for terms and territory.

Bergougnan Rubber Corporation

Trenton, N. J.

New York
49 West 64th St.

Philadelphia
1404 West Girard Ave.

Montreal
325 St. James St.



What happens when you throw in the clutch



The layers are arranged fanwise, so that, the strands of cotton in the various plies run in different directions. This patented construction gives the disc a uniform strength and elasticity which can be obtained by no other method.



The bolt holes are reinforced with fluted steel washers.



From two to four separate discs are used in each joint.

WHEN you throw in your clutch you connect the spinning flywheel with a motionless rear axle.

A powerful engine tends to keep the flywheel turning, while the weight of the car tends to keep the axle at rest. Something is bound to happen. Unless the engine is stalled or the mechanism breaks, the car is forced to move. In any case there is a severe strain on the shafts, gears, universal joints and all metal parts involved.

It can readily be seen that the more gradual the application of power, the less is the strain and the shock.

An inflexible, metal universal joint transmits the full power of the engine to the rear axle with one terrific blow. The steel bearing surfaces do not yield a fraction of an inch, and the whole chassis is violently wrenched and strained as the car lurches forward.

Thermoid-Hardy Universal Joints cushion the shocks of sudden starting. The flexible discs are so elastic that when the clutch is thrown in, the forward end of the propeller shaft can revolve five degrees or more before the axle is forced to turn. As a result there is a smooth, gradual application of power, and the car glides forward without the slightest shock or vibration.

Lengthens the life of a car

Experience has proved that the use of Thermoid-Hardy Universal Joints

lengthens the life of a car to a marked degree. The elimination of all sudden shocks and strains between the motor and the rear wheels reduces wear and breakage to a minimum.

No Attention Needed

Thermoid-Hardy Universal Joints need no protection and no lubrication. They are absolutely silent in operation and unaffected by the action of sand, mud, oil or water.

Fifty leading manufacturers of passenger cars and trucks have adopted Thermoid-Hardy Universal Joints as standard equipment.

Send for our new book "Universal Joints—Their Use and Misuse." It will give you details of construction, records of performance and opinions of leading engineers.

Insist that the car you handle be equipped with Thermoid-Hardy Universal Joints.

Thermoid-Hardy Universal Joints will make good—or WE WILL.

Thermoid Rubber Company

Sole American Manufacturers

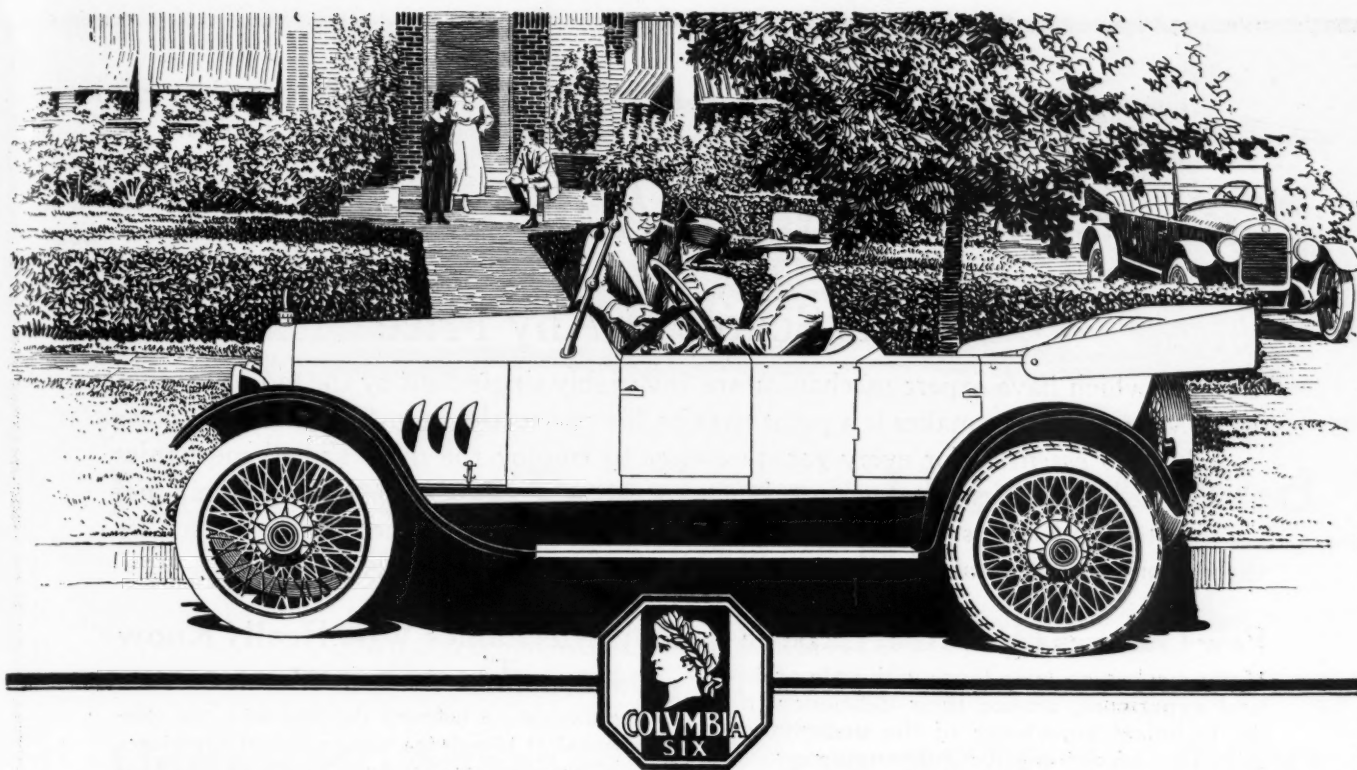
Factory and Main Offices: Trenton, N. J.

New York	Chicago	San Francisco	Detroit
Los Angeles	Philadelphia	Pittsburgh	Cleveland
Boston	London	Paris	Turin

THERMOID-HARDY UNIVERSAL JOINT

Fanwise construction for strength

Makers of "Thermoid Hydraulic Compressed Brake Lining" and "Thermoid Crolide Compound Tires"



The Family's Reason

Every member of the family likes the Columbia Six.

The young people like it because of its spirited power and clean-cut design. The older members of the family like its rich appearance, its substantiality—the ease with which it is maneuvered—the confident comfort they enjoy while they are in the car. They all like

it because it is the same good car each time they take it out—a joy to drive; a beautiful car to own.

Columbia dealers throughout the country tell us that they do not know of another car which appeals to all the family, both as a riding and a driving car, the way the Columbia does.

The Columbia is good all the way through, not only as a car but as a substantial business proposition. We are always glad to hear from dealers who can measure up to Columbia standards.

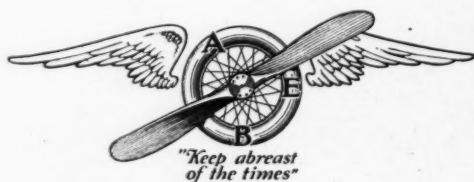
Units You Know—And Respect

Timken Axles—Continental Red Seal Motor—Detroit Pressed Steel Company Frame—Radiator with "Sylphon" Thermostatically Controlled Shutters—Spicer Universal Joints—Borg & Beck Clutch—Durstons Transmission—Detroit Steel Products Company's Springs—Gemmer Steering Gear—Auto Lite Starting & Lighting—Atwater-Kent Ignition—Stromberg Carburetor—Prest-O-Lite Storage Battery—Painting and Trimming by The American Auto Trimming Co.—Pantasote Top—Firestone Tires.

COLUMBIA MOTORS CO.

DETROIT, U. S. A.

Columbia Six



GARAGEMEN— MECHANICS

Increase your shop efficiency—and your profits. Become an expert. There is big money for the man who really knows.

Experts Scarce at Any Price

Garages which have expert mechanics are invariably singled out by the motoring public. Every car owner makes it a point to take his car to the man "Who really knows how." It is essential for every garage owner to employ the most skilled mechanics obtainable—and in this respect garage men can well afford to encourage their mechanics to avail themselves of the Individualized Correspondence courses offered by the Automotive Educational Bureau.

Few Garages Have Real Experts

Many mechanics, even those with only practical experience, realize their deficiency in the technical knowledge of the underlying principles of automotive engineering practice.

There is a big opportunity for men who are ambitious to study and train themselves so that they thoroughly understand the work they are doing. The application of such knowledge with their practical experience in every day work develops the real expert.

Few Mechanics Who Really Know Their Business

In the automotive industry the man who can combine technical knowledge with practical experience and ability soon goes to the top. There are thousands of high salaried positions waiting for men of ability to fill them. The demand for men is far in excess of the supply of experts required by this foremost of industries. There is big opportunity in the automotive industry—and it is only limited by a man's ambition and his willingness to study and train himself for the realization of his ambition.

Send for This Valuable Booklet To-day

A very interesting prospectus giving full details of the prescribed outline of study will be sent promptly upon request.



Special Service

The Automotive Educational Bureau arranges its service to suit the individual need of its subscribers. If the subscriber does not require special service the bureau has a regular outlined series of instruction papers. In addition the bureau will furnish advice and information pertaining to both the studies or problems that may arise in the subscriber's daily work. There is no extra charge for this special service.

The Cost Is Small Pay While You Learn

Send the coupon in today. Recommend this training to your employees. Finance your deserving employees. It means expert mechanics—and the garage that can boast expert mechanics is always loaded with work.

Outline of Study

The prescribed outline of study includes information on every subject pertaining to automotive engineering. Every unit of the automobile is described in a manner which is easy to read and easy to comprehend. This INDIVIDUALIZED CORRESPONDENCE concentrates exclusively on the work which you are vitally interested in. It presents the fundamental principles in such a way that you can absorb and retain them with a minimum of time and study.

- ☐ Garage Owner
☐ Mechanic

Automotive Educational Bureau,
1203 Farnam St.,
Omaha, Nebr.

Gentlemen:

I will be pleased to receive full details and literature concerning your INDIVIDUALIZED CORRESPONDENCE plan of improving my ability and knowledge of automotive subjects.

Name
Address

Automotive Educational Bureau 1203 Farnam St.
Omaha, Neb.



Highway Trailers Unmatched In Price or Quality

*Standard Model Exclusively Accepted With-
Out Modification by U. S. Army and Navy*

Undersell Average Trailers \$250 to \$400

Highway Trailers have gained a highly important place in truck transportation.

Experts agree they add 50 per cent to hauling efficiency.

The United States Army and Navy, operating more than \$1,000,000 worth, proved they cut haulage costs, in excess of rated truck capacity, by 80 per cent to 90 per cent.

The remarkable growth of their use has created big money-making opportunities for dealers.

You can share in these profits. With a Highway Trailer franchise, your sales are limited only by the number of trucks in your territory.

Highway Pipe and Pole Trailers are in keen demand in the oil fields, steel industry and lumber centers. Trucks alone won't serve.

More than 180 lines of business employ Highway Trailers.

There is a type for any need.

Write for details.

Four Wheel High Speed Heavy Duty Reversible Type Trailers

1 1/2 TON Capacity	2 1/2 TON Capacity	4 TON Capacity	6 TON Capacity
\$575	\$785	\$1075	\$1395

HIGHWAY
EDGERTON
WISCONSIN **TRAILER**

Will Fill a New Field in the Great Automobile Industry

THINK of the appeal in a Six Cylinder Car, built for the motorist of moderate income! The car must be one of unusual economies.

Only big quantity production can make such a car possible—and quantity production is not possible without a revolution from old principles of construction.

The Willys Corporation has produced exactly such a car. It is a revolutionary Six—and is one of the few great forward steps in automobile history since the invention of the pneumatic tire. It fills a great gap in the industry—and has a field all to itself.

Behind this revolutionary car is the Willys Corporation, one of the biggest and strongest manufacturing concerns in the automobile industry. At its head is John N. Willys, president also of the Willys-Overland Company, who has successfully built and sold over 650,000 automobiles.

The business of the Willys Corporation, exclusive of the building of the new Six, is the manufacture of Electric Auto-Lite, starting and

lighting systems, and New Process Gears for transmissions and differentials of automobile trucks and tractors.

The Electric Auto-Lite business is the largest in its class in the industry. More starting and lighting sets for automobiles are, and have been made by this company than by any other two concerns in the business. Production is now at a rate of over sixteen hundred complete sets per day, and orders for future deliveries are on hand for four thousand sets per day. This company supplies the principle automobile builders.

The New Process Gear business was organized in 1912. Today it is one of the largest in the industry; and, because of the high quality of its products, the demand is constantly expanding. The factory covers a seven acre site and employs from 1800 to 2000 highly skilled operators.

In addition, the Corporation is producing the Willys Light for the lighting of country homes and farms. In the month of August alone, orders were received for

20,000 Willys farm-light outfits.

The extensive plants of these units are located at Toledo, O., Syracuse, N. Y., and Poughkeepsie, N. Y. They will be sources of supply for the construction of the new Six.

For the building of the new car the plant of the Duesenberg Motors Company, at Elizabeth, N. J., was purchased and is being enlarged to give a capacity of 400 to 500 complete motor cars per day.

The new Six has many new and outstanding features—an entirely new, but thoroughly proven, type of spring suspension being one of them. The car is of remarkably light weight—approximately 2100 pounds, and has notable road holding, non-skidding and easy riding qualities. It has extraordinarily low gasoline consumption—17 to 20 miles per gallon. The chassis is a marvel of simplicity. The details are all noteworthy.

Anyone desiring further information about the plans and car program of the Willys Corporation should write for our booklet.

Willys Corporation

52 Vanderbilt Ave., New York

N. B.—This is one of a series of advertisements to acquaint the public, automobile trade and buyers of motor cars in general with the present scope and important plans of The Willys Corporation.

\$22,630,200.00

*Represents the value in American built
Automobile Tires exported to foreign lands
during the fiscal year ending June, 1919.*

Would you like to know just how this vast business in tires was distributed among the nations of the earth?

Would you also like to know the import duties of the various nations on American built tires? This and other important information to both manufacturer and distributor of tires is to be found in the *October issue* of THE TIRE RATE BOOK.

Anticipate your requirements and place your order **now**.

Hundreds who desired copies of the July issue were disappointed because they failed to send their order when their requirements could have been taken care of.

Now is the time to order for the October issue. To delay is to be disappointed.

THE TIRE RATE BOOK

Published by The Class Journal Company

239 West 39th Street

NEW YORK CITY

Subscription Blank

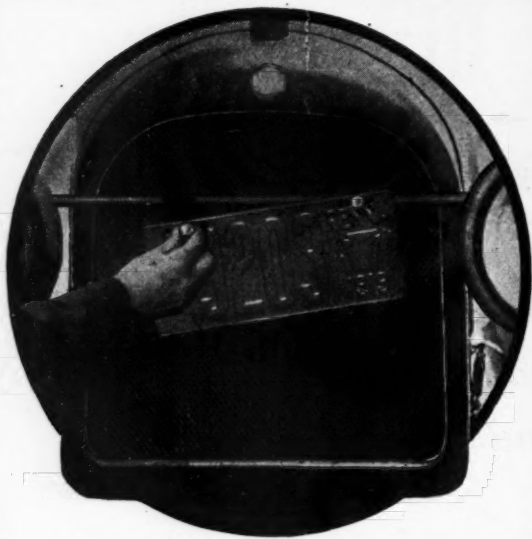
THE TIRE RATE BOOK,
239 West 39th St., New York City.

Please enter my order for.....
The Tire Rate Book for which I enclose \$.....

{ Copies
Subscriptions

Subscription price one
year (4 issues) \$1.00. Copy price 35c.
Name
Address.....
City.....

Subscription will begin with the October issue.



Every Car Owner

—NEEDS THE—

Lambert License Plate Holder

Easily attached or removed in a second—Holds fast without a rattle or noise of any kind—requires no bolts—just slip holder through slot in plate, then through slot in the bracket, give quarter turn and your license plate is on to stay.

Made of the very best grade of steel and guaranteed to hold fast under any and all conditions.

Retail price—\$1.00 for set of four holders.

DEALERS: Send in your order now for the Lambert Plate Holders. There will be a tremendous demand and sale for this holder when the new 1920 licenses are issued.

Stock up now and avoid any possible delay and disappointment because of shipments.



Attractively displayed—50 on each card. They will sell themselves by simply placing the card on your counter. One of the most profitable accessories the dealer can handle.

Send for dealers' and jobbers' discount sheet and trial order today.

Lambert Manufacturing Co.
Highland Bldg.
Pittsburgh Penna.

Save

TIRES LIKE THESE

I Earned \$2200 In Four Months
This is Richard A. Oldham. Mr. Oldham was telegraph operator for the Illinois Central Railroad for twenty years. He is fifty-eight years old. One day he read one of my advertisements and the possibilities of making money in the Auto Tire Surgery Business. In a few weeks he had purchased and installed a Haywood outfit. A short time afterward he wrote us that his income in four months was as much as it had been in 2½ years as telegraph operator.

Be a Tire Surgeon
MAKE \$2,500 TO \$4,000 PER YEAR GIVING NEW LIFE TO OLD TIRES

It is being done—by the wonderful new Haywood method of Tire Surgery. It is one of the great results of the war. A Haywood Tire Surgeon can do more with old tires than was even dreamed of before the war. By the Haywood Method a Haywood

Tire Surgeon can give 4,000 to 5,000 more miles of new life to a tire, that two years ago would have been thrown on the junk pile. As a surgeon saves human lives by his operations, so by Haywood Tire Surgery, you can save and lengthen the life of old tires. And it's easy to learn.

HAYWOOD'S TIRE SURGERY

Stations Are Needed Everywhere

20,000,000 tires wearing down every day. By Tire Surgery, you can quickly repair, rebuild and give new life to tires seemingly all worn out. Cuts, gashes, tears, bruises, broken fabrics, every kind of an accident that can happen to any tire, inside or out, you can repair and save for long service. The chance to make money is simply wonderful.

\$2,500 to \$4,000 A YEAR is possible

During the war the nation needed an unusual service to keep the thousands of automobiles, ambulances and aeroplanes going day and night. Haywood Tire Surgery met the demand.

If we told you all the truth you wouldn't believe it. You would say, "It is too good to be true." But you can see what a great field there is for Haywood Tire Surgery Stations—for this better way. You have eyes. You see why there must be wonderful chances to make money. But to see—to know is not enough.

It is action—decision—that counts in these days. The man who waits, gets lost in the shuffle. It is the resolute will to follow your hunch that lands you where the money is.

Send Today for My Free Book

I have ready to mail you the day I get your request, a fascinating book—all about tires—how to repair them by the Haywood Method—how to start in business—how to build up trade—what to charge. You needn't write a letter—just tear out the coupon right now, fill it in and mail. In 48 to 72 hours you can have the whole proposition right in front of you. It's a case of walking right into \$2500 to \$4000 a year and up. Use coupon at the left.

M. HAYWOOD, Pres.

Haywood Tire & Equipment Co.

WRITE TODAY

M. HAYWOOD, President
Haywood Tire & Equipment Co.
500 Capitol Ave., Indianapolis, Ind.

DEAR SIR: Please send me by return mail your free book on the new Haywood Tire Surgery Method and the details of your free school of tire repairing.

Name
Address

500 Capitol Avenue
Indianapolis Ind.



Ford and Fordson Dealers

Your Work



Babbitting Jig. U. S. and Foreign Patents Pending

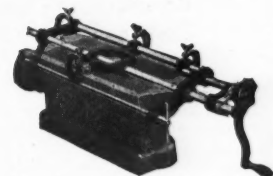
Replacing the main bearings in a Ford or Fordson is logically a job that should be done in your own shop.

Doing this work in your own shop increases your business—adds to your profit—saves customers delays—keeps them satisfied.

Universal Main Bearing Replacement Equipment is easy to operate and makes perfectly aligned true bearings.

See current issue Auto Trade Directory and Chilton Directory for list of jobbers carrying stocks.

Your Profit



Boring Bar. U. S. and Foreign Patents Pending

The Universal Tool Company, Inc.
435 Woodward Avenue Detroit, Mich.



UTCQ. PRODUCTS

Manufacturers of Universal Cylinder Reboring Tools and Main Bearing Replacement Equipment for Fords and Fordsons

"The Show of Shows"

FIFTH ANNUAL

National Tractor Show

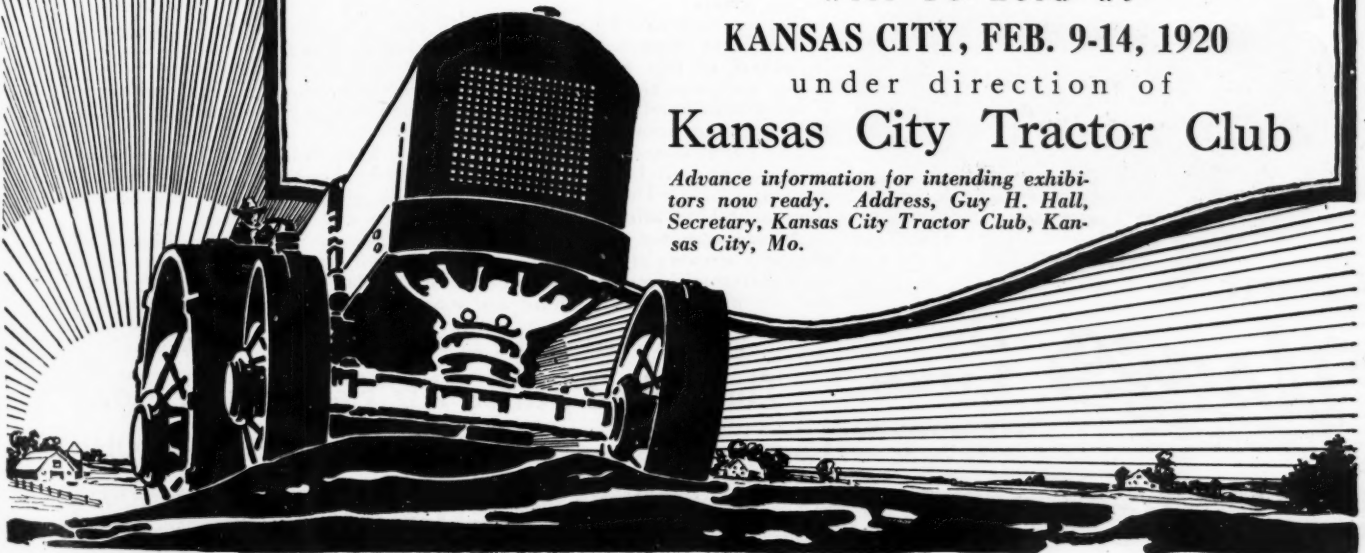
will be held at

KANSAS CITY, FEB. 9-14, 1920

under direction of

Kansas City Tractor Club

Advance information for intending exhibitors now ready. Address, Guy H. Hall, Secretary, Kansas City Tractor Club, Kansas City, Mo.





Complete with Rings
and Pin

TRIAL ORDER

Garages and Repair Shops
DETROIT METAL PRODUCTS CO.,
Detroit, Mich.
Please ship by Parcel Post prepaid,
1 complete set of COCHRAN PISTONS

Size Price \$7.20
Name
Address

Cochran Ford Pistons

Complete with RINGS and PIN

Increases Mileage 25 per cent

Furnished in Standard Size.

Also the following Oversize.

.0025 .005 .010 .015 .020 .025 .03125 .045

Prompt Delivery---Price \$2.50

DETROIT METAL PRODUCTS CO.
DETROIT, MICHIGAN

How much Time to Inflate A Giant Truck Tire



Giant

Usaco
AIR COMPRESSORS
TRADE MARK

De
Luxe

Two Stage Automatic
Air Compressor

PNEUMATIC TRUCK TIRES are here to stay. Are you equipped to serve them? Have you capacity for the marvelously growing demand on air plants.

To put 130 to 150 pounds into a tire is no pygmy task. It requires a compressor specifically designed for this service and a tank pressure far in excess of this amount.

An ordinary compressor requires too much time for this service even if capable of handling it—and if overloaded to accomplish the end it is sure to depreciate prematurely.

The Giant Usaco De Luxe Compressor, here illustrated, is an evolution of the Standard Usaco De Luxe, of which thousands are in use. The Standard Usaco De Luxe is fundamentally a high pressure machine but this Giant Unit affords even greater service and satisfaction.

A larger motor with a compressor of greater capacity, a bigger tank provides greater storage capacity; a new air purifier assures getting the very purest air free from oil or moisture; a fan type flywheel amply cools the compressor. Then there are many other features of value.

Write for circular giving all the facts about both machines.

The United States Air Compressor Co.

Carnegie Ave.

CLEVELAND, OHIO

By Far the Best by Every Test

Presto Electric Heater

Attaches to Any Electric Light Socket



For Increasing Winter Business

This winter sell the Presto Electric Heater. It's popular with all car owners.

At night simply screw the plug into the nearest electric light socket, put the Presto Heater under the hood and be assured of a warm and easy starting engine in the morning.

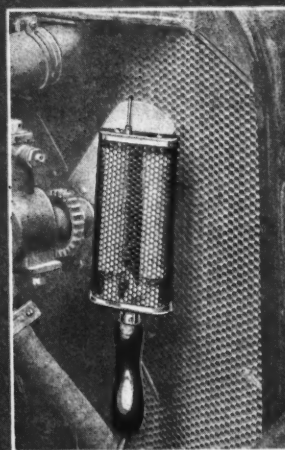
THREE BIG FEATURES

Easy Starting—Keeps the engine, manifold and radiator warm during the night, making starting as easy as in warm weather.

Safety—There is absolutely no danger of fire, as where flame heat is used.

Economy—Delivers the heat exactly where it is wanted—inside the hood.

Write for complete information.



PRICE COMPLETE
with 10 Feet of Cord
and Plug

\$4.50 U. S. A.—\$5.00 Canada

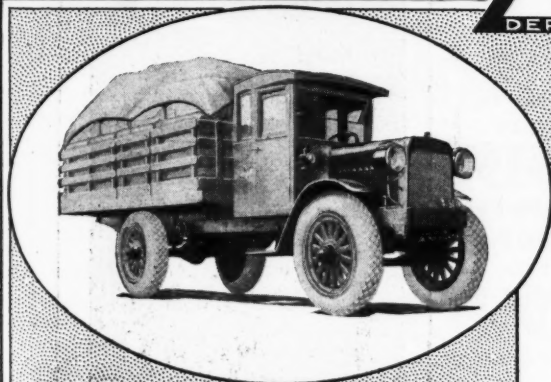
Metal Specialties Mfg. Company, 338-52 N. Kedzie Ave., Chicago
EASTERN BRANCH—163 W. 51st St., New York WESTERN BRANCH—149 New Montgomery St., San Francisco

TRI-ANGLE



A Three-Fold Value

¾ · 1½ · 2 Special & 2½ Ton Models



Eastern Representatives
TRIANGLE MOTOR SALES CO.
381 Fourth Ave. New York City

New England Distributors
Eugene F. Lally and Sons Co.
Boston, Mass.

THE fact that the sturdy TRIANGLE TRUCK is pleasing more and more critical customers every day is a significant commentary on its unusual **power, service and dependability.**

There are no weak spots in the TRIANGLE. Planned by a foremost engineer; built of the most approved units; and put together for **honest service**; prudent dealers everywhere are recognizing TRIANGLE TRUCK SALES to be a paying investment in the good will of their customers.

Some choice territory still open. Address or wire Dept. X,

TRIANGLE MOTOR TRUCK COMPANY
St. Johns, Michigan

NEW YORK

AUTOMOBILE REPLACEMENT IGNITION COILS



New York Automobile Replacement IGNITION COILS

New York Automobile Replacement Ignition Coils have actually put hundreds of the smaller Garages and Service Stations in business—and are today the most treasured line of the largest Service Stations throughout the U. S. The explanation is simple. Most drivers have learned that the best car and engine fitted with the highest grade carburetor and workmanship cannot deliver its full power, smoothness or service unless the Ignition Coil delivers more than "just a spark."

Weak, partly broken down coils spoil owners' pleasure and temper, also your reputation, and the car's utility. A special New York Coil engineered to suit the exact requirements of each car manufactured—that will fire the poorest gas—that positively will not "miss" at highest engine speeds and rival magneto ignition is available.

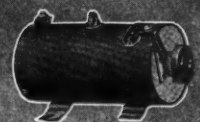
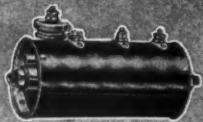
They are installed with no trouble in ten minutes, as they positively fit each car. Fifteen years of successful coil building experienced by an organization of Ignition Specialists, is the reason a car owner always agrees when told he needs a New York Coil.

More real profit, less come backs and easier made sales than any article you ever handled.

NEW YORK COIL COMPANY

338-340 Pearl Street

New York, N. Y.



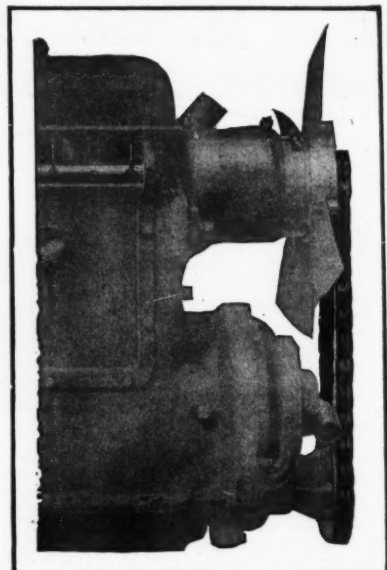
Link "V" on a Nash Motor

Here's a G & K Link "V" Fan Belt on a Nash Motor. The Nash Motors Company adopted it 2 years ago as regular equipment and as proof of satisfactory service they are still equipping their cars with this belt.

The Link "V" Belt is a combination of leather, fibre and steel links, so constructed that the steel and fibre links carry the strain. The leather links only come in contact with the pulley to give the required friction surface. It's long-lived.

There's a Link "V" Fan Belt for each make of car.

Dealers: Write us for our sales proposition



The Graton & Knight Mfg. Co.

Automotive Equipment Division

Worcester,

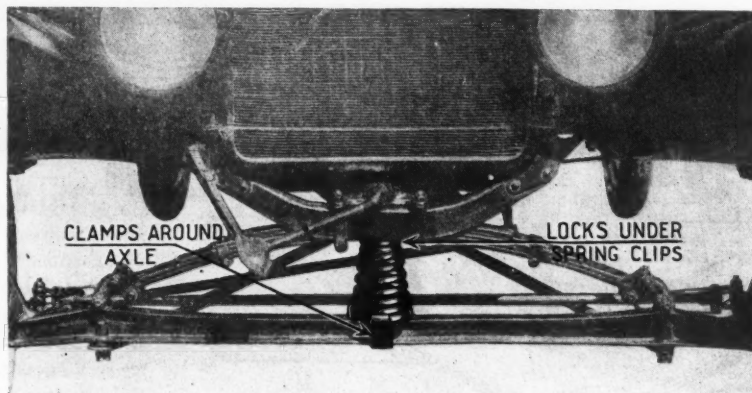
Mass.



The *ARG* Auxiliary Spring

IS ONE OF THE BIGGEST SELLERS ON THE MARKET

**Prevents
Breaking Front
Spring**



**Can be in-
stalled in a few
minutes**

**Dealers—Demonstrate the ARG Auxiliary Spring to the Ford Car Owners in
Your Territory**

Every dealer knows that front springs on Ford cars break when they rebound beyond their normal arch. The ARG Auxiliary Spring reduces the rebound—and prevents serious mishaps to the front end such as wearing out spring hangers, breaking tie bolt, fender irons cutting tires, steering arm locking on radius rod, radiator leaks caused by heavy jars.

DEALERS! YOUR JOBBER CAN SUPPLY YOU

Here is a device which you can recommend—a device which will interest every owner of a Ford passenger car, roadster, or truck.

ARG Auxiliary Springs are built in two sizes—heavy and light. In ordering specify whether for Ford roadster, touring car, or truck. Price, \$5 each.

Our Guarantee: They must make good--or we will

ARG

AUXILIARY SPRING CO., INC.,

Birmingham, Ala.

Syco Products

"Little Side Paths To Satisfaction"

Dealers are in-
vited to write us
for sales propo-
sition.

Exclusive Terri-
tories.

GLOSSO
FOR AUTOMOBILES
AND FURNITURE

"The finish that reflects a smile" is a perfect, superfine cleanser-polish for Furniture and Automobile bodies.

FERRET
HAND SOAP
A GREASE SOLVENT

The soap that "gets" the grease from out the pores in the skin, without irritating or injuring the most tender hands.

KLENZA
FOR HOUSEHOLD-FOR SHOP

A most efficient grease and dirt eradicant. Fine for laundry or for general cleaning: Toilets, Bowls, Marble, Tile, etc.

STARLITE
METAL POLISH

The unsurpassed Metals polish. Thoroughly efficient for polishing Brass, Nickel and Aluminum.

GEAR CLING
A REAL LUBRICANT

A lubricant especially adapted to gear "silencing." Gear Cling stays put, has the right viscosity and reduces friction to the minimum.

THE FEDERAL CORPORATION

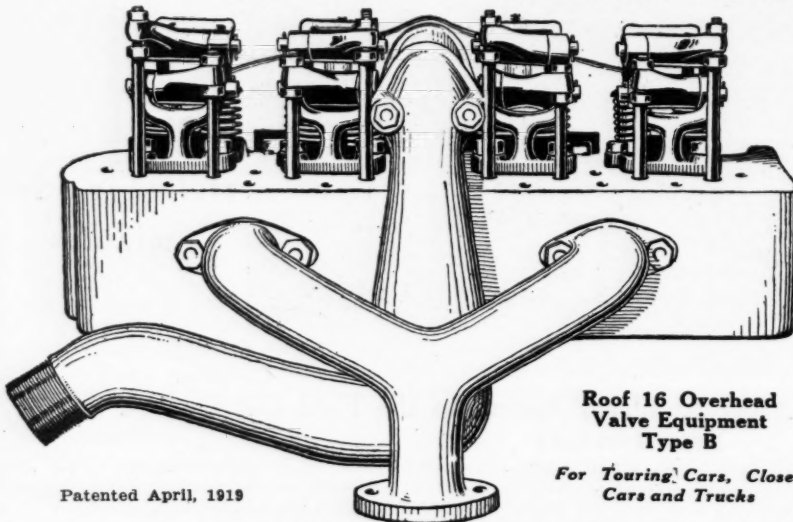
Westfield, Mass., U. S. A.

Also manufacturers of Liberty Spark Plug and Jumbo Spark Plug

POWER and SPEED

Roof 16 Overhead Valve Equipment

FOR FORD MOTORS



Patented April, 1919

Roof 16 Overhead
Valve Equipment
Type B

For Touring Cars, Closed
Cars and Trucks

Comparison Brake Horse Power Tests at the United States Bureau of Standards gave Standard Ford motor with regulation carburetor 18.7 Horse Power. The same motor with 16 Valve Head and regulation carburetor 22.4 Horse Power. The same motor with 16 Valve Head and Special carburetor 29.7 Horse Power. Recent tests at U. S. Bureau of Standards gave 32 Horse Power. We are Manufacturers and Distributors of speed and other specialties for Ford cars; 3 to 1 gears, high speed camshafts, aluminite, light grey iron pistons, lynite pistons, aluminite connecting-rods, racing spark plugs,

racing carburetors, roller bearings, counterbalances, wire wheels, multiple speed transmission, high tension magnetos, special oiling system, special worm and gear, steering gear, racing tires, racing bodies, hood and radiator, parts for underslinging chassis. Tell us what you want. We can supply it. Racing quality. Lowest prices. Send for our Complete Literature on how to build fast cars and double the value of your converted Ford Truck and descriptive circular on Speed and other Specialties for Fords.

LAUREL MOTORS CORPORATION

The Most Remarkable Power Device, Even in This Inventive Age

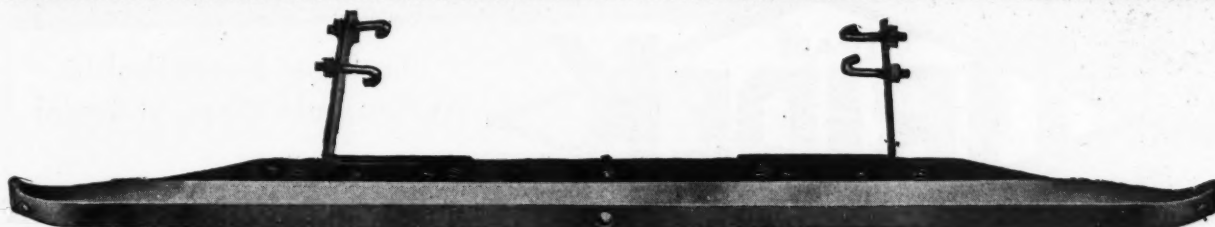
Hill Climbing for touring cars—pulling power through sand and mud—doubles the hauling capacity of converted Ford truck-speed for mile and half-mile tracks to rival the fastest cars built. Ford racing cars with our Cylinder Head Equipment and special racing parts have attained speeds from 80 to 100 miles per hour. Price, complete, \$115.00 f. o. b. factory, excise tax paid. Nothing extra to buy. Cylinder Head Equipment all ready for installation. It takes the place of the regular Ford Cylinder Head. Any mechanic can easily and quickly install it.

Anderson, Indiana, U. S. A.

**MOST JOBBERS
AND
DEALERS
SELL
THE
ROSE LINE
OF
PUMPS
AND
GREASE
GUNS**

**ROSE
PRODUCTS
ENCIRCLE
THE
GLOBE**

**MFG BY
J.H HANEY & CO
HASTINGS NEB**



The Shock Absorbing Star Bumper Protects the Car Without Damage to Itself

GLANCING side blows—head on shocks, are all parried by the Star Bumper.

It so absorbs the blows that it not only protects the car but does this without any damage to itself. You'll never find a Star bent or twisted out of shape.

For 3½ inches back of the protecting front channel bar is a straight bar, between these are five strong coil springs that diffuse the shock—taking it up before it reaches the car. From

this strong spring cushion run arms of steel back to the frame—clamped on with a bulldog grip.

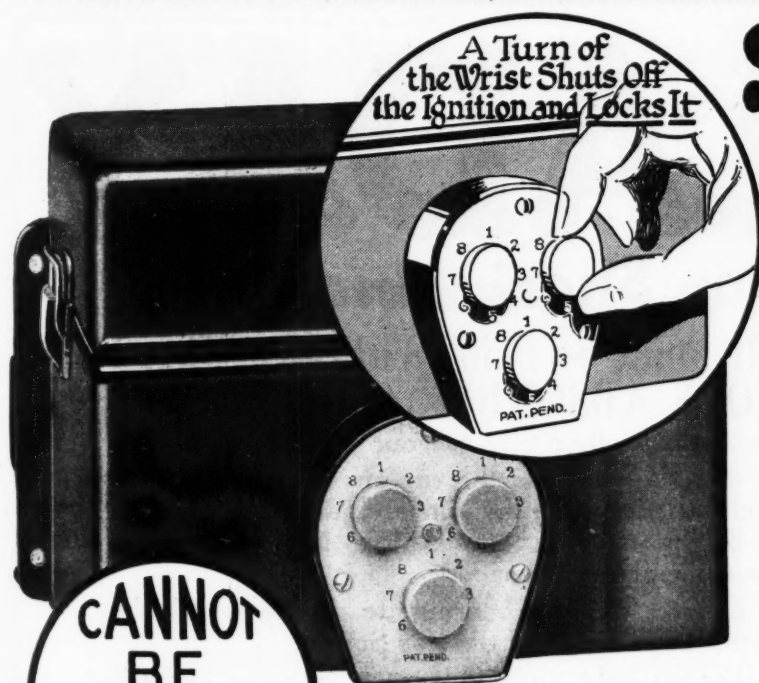
Rubber inside the springs insures against any rattle.

The Star Bumper is made of high carbon steel—finished in nickel and black. It fits any car and goes on either front or back of car.

Write your jobber for Star Bumpers—it pays you a profit that makes selling it worth while. Write today—now.

Jobbers—Get our liberal trade proposition, also write for a sample bumper

Clevenger Engineering and Sales Co.
86 McKinley Place, Ridgewood, N. J.



**CANNOT
BE
WIRED
AROUND**

Price
\$6.00

Simple ~ Safe!

CHRISTIE COMBINATION Keyless Lock for Fords

Simple in design and construction—simple in operation—safe from the most skillful thief—that describes the CHRISTIE Combination Keyless Lock for Fords.

Thousands of combinations are possible and only the right one will unlock the ignition. This lock baffles the professional auto thief.

Underwriters' Laboratories Inspected—Reduces Insurance 15 per cent.

A CHRISTIE Equipped Ford Cannot Be Stolen

The CHRISTIE cannot be wired around—it foils the most experienced thief.

The lock is securely bolted to the coil box. The heads of the bolts are covered by the top of the lock and cannot be removed.

Dealers—You can make money by selling a really safe lock. There is a big demand for the right kind of Lock for Fords. Send a draft for first sample lock and details of our proposition.

CHRISTIE AUTO LOCK CO.

6607 Dorchester Ave., Chicago, Ill.



TRADE
DRIDEK
MARK
REG

The Most Remarkable
Automobile Top Material

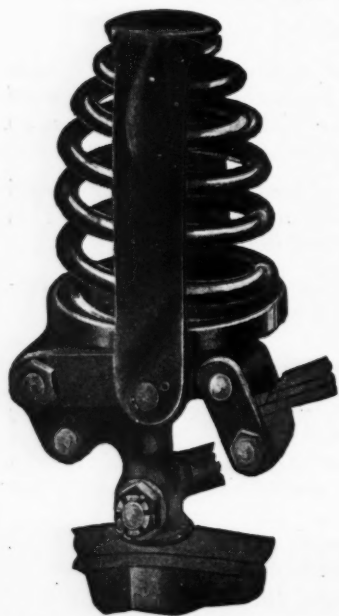
LIGHT IN WEIGHT—DEPEND-
ABLE IN QUALITY — NON-
CRACKING — NON-BLISTERING
—Dridek is Made to Satisfy.

Send to Dept. C for Samples and Prices

L. J. MUTTY COMPANY
BOSTON, MASS.

HALLADAY

Direct Suspension Shock Absorber



Compare It Point by Point With Any Other FORD SHOCK ABSORBER on the Market

Consider these features, then buy as your judgment dictates.

The Halladay directly suspends the car on four sensitive springs of sufficient **capacity** to absorb all the jolts and jars and prevent rebound. The Halladay Springs are the famous "Bee Hive" type, the longest lived and most resilient spring made.

The Halladay has no frictional bearings to interfere with the Spring action and cannot bend or break the leaf Spring.

The Halladay has no light, breakable parts or parts to be lost.

Sold strictly upon its merits and positively guaranteed to give satisfaction.

Write for all the particulars

Price per set.....\$15.00

L. P. HALLADAY COMPANY

Manufacturers of Bumpers, Shock Absorbers and
Automobile Accessories

520-530 Monroe St.

Streator, Illinois



Quality

The DOUBLE ROW Type is not an experiment. It has been used successfully and in large quantities for over a decade. No other bearing is so efficient for carrying combinations of radial and thrust loads while reducing bearing friction to a minimum.

THE NEW DEPARTURE MFG. CO.,
Bristol, Conn. Detroit, Mich.

466

New Departure Ball Bearings

HERE'S WHAT THEY'RE SAYING ABOUT "ZIP"

"The Real Tube Patch"

That Requires No Cement.

"The best cold patch on the market."—Gilmore and Riley Vulcanizing Shop, Springfield, Mo.

"It does the work and is worth the money."—M. H. Tucker, Kansas City, Kas.

"It is a good vulcanizer."—J. W. Tredway, Stillwell, Kas.

"ZIP gives the very best of satisfaction. It has no equal."—Pratt Bros., Topeka, Kas.

No Heat.

"Good. Send me three dozen 50-cent size at once."—E. B. Glidewell, Springfield, Mo.

"A-1. Expect to order more in the near future."—Geo. A. Kralik, Hoisington, Kas.

"We find ZIP very satisfactory."—Kaw Valley Buick Co., Kansas City, Kas.

"The best we have ever used."—Ayers & Co., Luray, Mo.

No Skill.

"I am selling Zip right along and it seems to be giving good satisfaction. I believe it is the only cold tube patch on the market and better than vulcanizing."—M. L. McDERMOTT, Kansas City, Kan.

These are just a few of the hundreds of testimonial letters we have received regarding "ZIP"

Write for our attractive selling proposition on "ZIP"

BAKER AND LOCKWOOD MFG. COMPANY

BROOKLYN,
473 Kent Ave.



Established 1870

Kansas City, Mo.

CHICAGO,
3021 Michigan Ave.

No Jumbo Distributor Ever Gave Up His Franchise



*Guaranteed for
a Full Year*

FULL LINE OF SIZES

JUMBO
MOTOR TRUCKS

There are many good reasons for this exceptional record of loyalty—

First: There isn't a single Jumbo dealer who is not making money.

Second: Jumbo "high-quality" performance—there is not a single dissatisfied Jumbo owner in the country that we know of.

Third: An honest sales policy that offers real assistance to dealers—Jumbo trucks are sold without misleading claims or false statements of any kind.

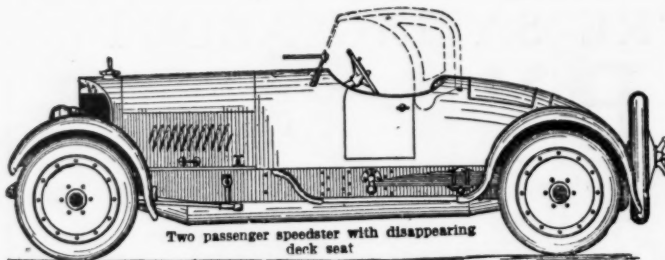
Fourth: Jumbo trucks are so well built and the factor of safety so well provided for that they can be guaranteed for twelve months—not just ninety days.

Fifth: Jumbo dealers are farsighted—they realize that Jumbo sales are increasing fast—will increase faster. And Jumbo dealers will reap the profits.

*Some desirable territory still
open. Write for details*

Nelson Motor Truck Company
SAGINAW, MICHIGAN

JOHN SIMMONS CO.,
102-110 Centre St., New York City
Eastern Distributors and Export Representatives



Two passenger speedster with disappearing deck seat

Singer

Unexcelled in superb finish and skilled workmanship.

A motor car distinguished from all others in design throughout. A pleasure vehicle for those who discriminate and demand distinctiveness.

We specialize in individual design.

Open models \$5,000.00; closed models \$7,200.00 and up.

Agency inquiries given prompt consideration

SINGER MOTOR CO. INC.

North Third Ave.

Mount Vernon, N. Y.

Is Your
Tire
Pump
Complete

Price
in U. S.

50c.

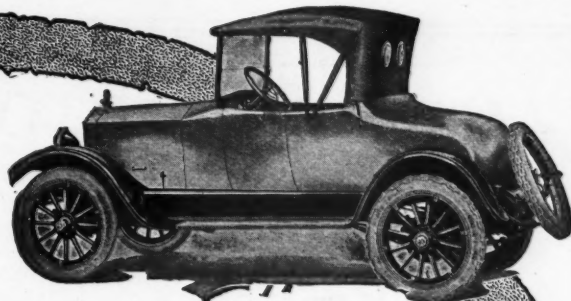
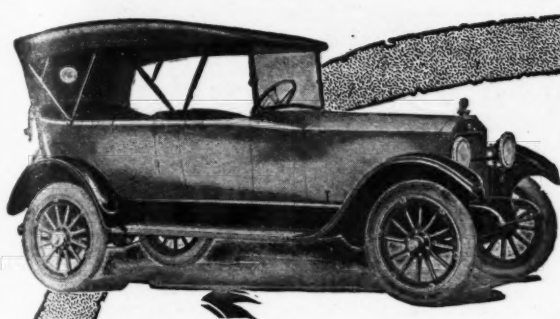


With a

**SCHRADER UNIVERSAL
PUMP CONNECTION**

attached to your tire pump you are saved the labor of pumping your tires up beyond the required pressure. It permits the measuring of the inflation without disconnecting the pump and the tire.

A. SCHRADER'S SON, Inc.
785-793 Atlantic Avenue Brooklyn



A Safe Investment

Men and women of today buy their cars as they buy their bonds.

They want safety, permanence and reasonable returns on their investments.

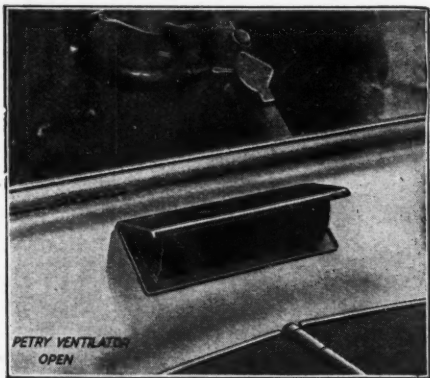
The car that will make good for the dealer, therefore, is the car that will make good for the owner.

The Dixie Flyer is built to pay large dividends in service and pleasure. It is backed by a permanent company with more than forty years' experience in vehicle manufacturing—a company that will be as willing and able to protect the interests of dealers and owners in the future as it is today.

KENTUCKY WAGON MFG. CO., INCORPORATED, THIRD AND G STREETS, LOUISVILLE, KENTUCKY

The **DIXIE** *Flyer*

The **DIXIE** *Flyer*



PETRY VENTILATOR
OPEN

THE PETRY VENTILATOR

THROWS a cooling air to that overheated place, the floor up under the cowl. The heavily nickeled, solid brass knob on dashboard regulates quantity of air wanted. The adjustable baffle-plate throws the air to any desired point. The Petry Ventilator adds snap to the appearance of any car. Easy to put on. Bolted thru the cowl to a sub-base. Rigid, dust-proof and waterproof when closed. Handsomely designed with beautiful lacquered finish.

The only stock ventilator adjustable to the curve of any cowl. Indispensable to closed cars. Special type for Fords, \$3.00. Universal type, applicable to any shaped cowl, \$5.00, including installation tool. Write for literature. Better send your order now and get prompt delivery.

N. A. PETRY & CO., Inc., 1309 Race St., Philadelphia

Makers of the Petry-Cut-Out and Pedal

DISTRIBUTORS

Gray-Heath Co., 1440 Michigan Avenue, Chicago, Ill.
Norman Cowan Co., 445 Rialto Bldg., San Francisco, Cal.
J. W. Van DeGrift, 627 Charles Bldg., Denver, Colo.

THE AUTO INDICATOR

Acts With
the Brake



AUTOMATICALLY

IN TIME TO

Prevent Collisions

ILLUMINATED AT NIGHT

Flashes from red to white in changing from "Go" to "Stop." The man behind can't miss your signal. The Right and Left arrows operate by small hand lever conveniently placed and enabling the driver to signal turns IN TIME.

Costs but **\$15** Complete

Good territory open for live representatives



The 4 in 1

Coast Representative
Norman Cowan Co.,
445-451 Rialto Bldg.,
San Francisco, Cal.

Wisconsin Representative
Diamond Tire & Supply
Co.
130 Oneida St., Mil-
waukee, Wis.

Southern Distributors
Automotive Exchange of
America,
Hippodrome Annex,
Cleveland, Ohio.

New England Distributor
S. P. Record,
405 Commercial Ave.
East Braintree, Mass.

THE AUTO INDICATOR COMPANY

203-213 Ottawa Ave., N. W.

Grand Rapids,

Michigan

BATTERY CHARGING PAYS BIG PROFITS

FALL AND WINTER PAY BIGGEST PROFITS

NOW is the time to start for BIG PROFITS in battery charging. Car owners are storing their cars for winter. That means thousands of batteries to keep in condition. Who gets this big, money-making business? You or your competitor who is farsighted enough to install a sturdy, reliable HB Battery Charger? Think it over. Is it good business for you to pass by the opportunity to add this \$100 to \$350 EXTRA PROFIT to your income every month? Start NOW to get those big battery charging profits, and build a big, permanent business.

Battery Charging Should Be Your Biggest Money-Maker

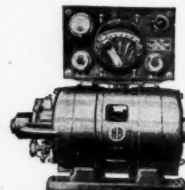
You will find that customers who come to you for HB Battery Charging soon start bringing you all their trade. Besides that, it costs only 10c to 15c each to charge batteries and the customer pays 75c to \$1.50. All HB Chargers are sturdy, dependable and absolutely reliable. Built of practically wearproof materials. Nothing to burn out, no expensive renewals or repairs. Plain, honest, profit-producing service 24 hours a day. No attention except occasional oiling. Uses power from your lighting lines. Big, quick, clean profits, easily made.

An HB Battery Charger for Every Size Business

Choose the Size You Need.

HB 500-Watt Charger

Recharges 1 to 8 6-volt batteries or their equivalent at a time. Charger is 27 in. long, 26 in. high, weighs 280 lbs. Furnished complete with clear black electrical slate switchboard, with mountings of ammeter, field rheostat, voltage lamp, two controlling switches. A big money-maker for a small battery business.



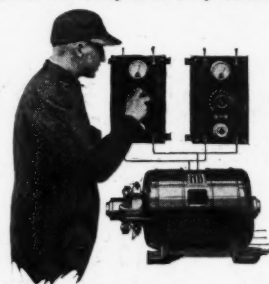
\$15 Cash

Balance on easy monthly terms

HB 16-Battery Charger

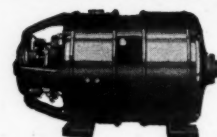
Recharges 1 to 16 6-volt batteries at once or their equivalent in 12 or 24-volt batteries. Motor 1 KW capacity. Operates on 2 or 3 phase current only. Furnished complete with 2 independent charging panels, each with capacity of 8 batteries. A splendid machine for any live, energetic garage owner wishing to get big profits.

Small cash payment
Balance on easy
monthly terms



HB 32-Battery Charger

Recharges 1 to 32 6-volt batteries or equivalent at a time. Motor 2 KW capacity. Operates on any current. Four separate charging lines, each capable of charging up to 8 batteries. Permits individual attention to batteries on charge. Ideal equipment for big garages or battery service station. Will make as high as \$250 to \$450 a month Clear Profit.



Small cash payment
Balance on easy monthly
terms

Sold on Trial Under HB Absolute Money-Back Guarantee

All HB Equipment is sold under our absolute guarantee of complete satisfaction. You run no risk. If not satisfied after using any HB Equipment 10 days, you may return it and receive all you pay us. The HB monthly payment plan is an additional guarantee.

Select the Charger You Need. Check the Coupon Below. Do it Now!

Mark on this coupon the HB Charger you are interested in. Tear it out and mail TODAY. This is your BIG CHANCE. Let us help you start your own money-making business. Be the first in your town to have an HB Charger. Don't delay. Act now.

TEAR OFF HERE

Hobart Bros. Co., Box A103, Troy, Ohio

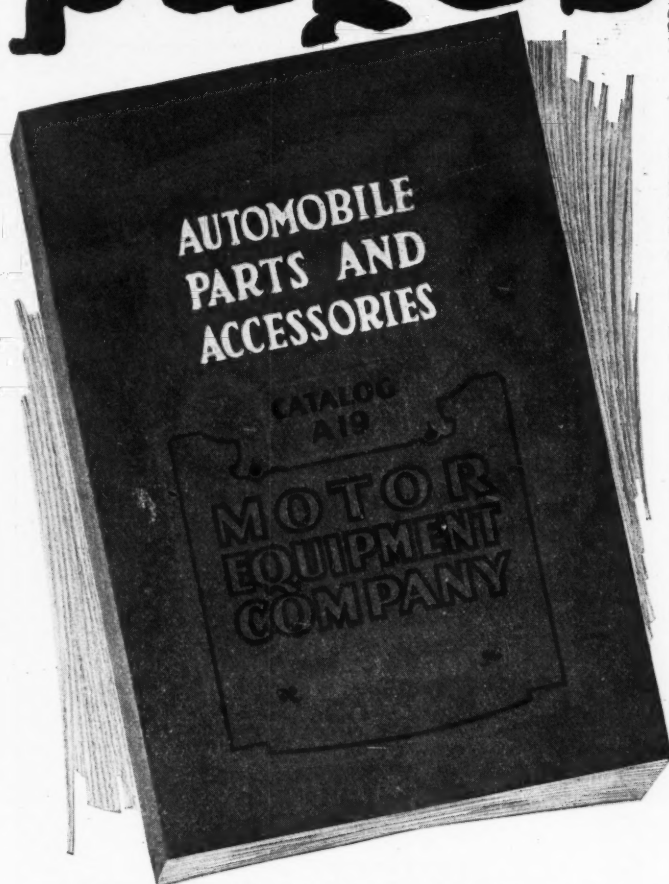
Send me information about the HB Equipment checked below, and tell me about the HB Money-Back Guarantee and Trial plan.

....HB 8-Battery ChargerHB Belted Charger
....HB 16-Battery Charger (Used where electric cur-
....HB 32-Battery Charger rent is not available.)

Your Name

AddressState

312 pages



EVERYTHING

in Automotive Equipment

*Send for your
copy to-day*

Catalog Sent to Dealers Only

JUST OFF THE PRESS

MOTOR EQUIPMENT COMPANY

1436-1438 MICHIGAN BOULEVARD
CHICAGO

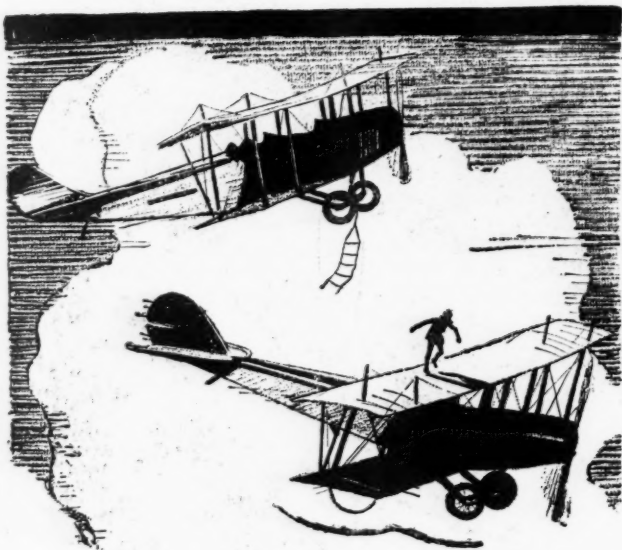
A detailed illustration of a Jumbo spark plug. The insulator is light-colored and features a large elephant logo. Text on the insulator includes 'JUMBO', 'MOLITE', and 'MADE IN U.S.A.'. The plug has a dark, hexagonal base and a threaded section. The background is dark with a faint elephant silhouette.

STURDINESS

**THE OLD
RELIABLE
"JUMBO"
THAT STOOD
ALL TESTS
FOR YEARS**

**THE FEDERAL CORP.
WESTFIELD — MASS.
ALSO MFRS. OF
LIBERTY SPARK PLUGS
SYCO PRODUCTS
DEALERS MAY OBTAIN
ATTRACTIVE PROPOSITION**

**JUMBO
SPARK
PLUGS**



A Sensational Leap

UNUSUAL speed, daring or quality are essential to win public attention nowadays.

Unusual qualities have made Prest-O-Lite

*The Fastest Growing
Battery Business in the World*

Over 20 leading manufacturers within two years have equipped their cars with Prest-O-Lite at the factory.

Hundreds of thousands of motorists now demand

Prest-O-Lite

THE BATTERY THAT BANISHES BOTHER.

No wonder Prest-O-Lite is easy to sell. Public interest is centred on Prest-O-Lite Service Stations by intensive local newspaper campaigns and national advertising in the leading periodicals.

The amazing growth of Prest-O-Lite offers great opportunities for new Service Stations if you can meet the qualification essential to the high standards of the great Prest-O-Lite Organization.

Write for information with regard to locations in your territory.

THE PREST-O-LITE COMPANY, Inc.

30 EAST 42nd STREET, NEW YORK, N. Y.

Canadian Address:

The Prest-O-Lite Company of Canada, Ltd., Toronto

511

ITALY

The Bay of Naples

And now the

KISSEL Custom-Built Six

has as standard equipment

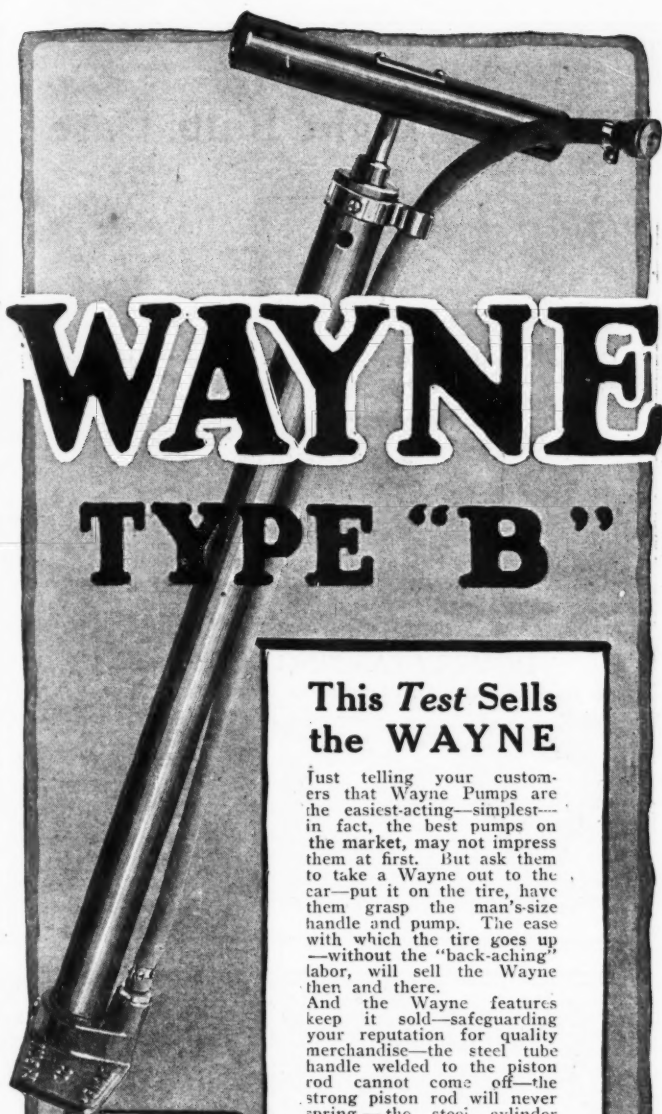
Genuine
Pantasote
Top Material

The wisdom of their choice is confirmed by the past experience of acknowledged leaders in high grade motor-car building whose cars using Pantasote include

PIERCE ARROW	WHITE
PAIGE LINWOOD	COLE
SCRIPPS BOOTH	REO SIX
MERCER	CADILLAC
COLUMBIA	PREMIER
LOCOMOBILE	HUDSON
CHALMERS	

Cheaper materials of similar appearance are frequently represented as Pantasote. Look for PANTASOTE label inside the top—it protects you against substitution which is not uncommon.

The Pantasote Company
Bowling Green Building
New York



WAYNE

TYPE "B"

This Test Sells the WAYNE

Just telling your customers that Wayne Pumps are the easiest-acting—simplest—in fact, the best pumps on the market, may not impress them at first. But ask them to take a Wayne out to the car—put it on the tire, have them grasp the man's-size handle and pump. The ease with which the tire goes up—without the "back-aching" labor, will sell the Wayne then and there.

And the Wayne features keep it sold—safeguarding your reputation for quality merchandise—the steel tube handle welded to the piston rod cannot come off—the strong piston rod will never spring—the steel cylinder will not corrode nor easily dent—the cylinder is secured to the base by the shoulder seating method that absolutely prevents leakage at this vital point and its coupling is large enough to grip. The hose is heavy weight, guaranteed for one year.

The Wayne Pump pays you a handsome profit on each sale—so that you can afford to give this product some time and thought. Write your jobber for Wayne Pumps.

We will supply you with detailed information and our sales proposition—write for it to

UTILITIES SALES CORPORATION

Suite 800 Stock Exchange Bldg.
Philadelphia, Pa.

Selling Agents for
WAYNE ENGINEERING CO.
Dept. "17-A"

Designing and Manufacturing Engineers at
Honesdale, Pa.

After October 1st we will begin marketing a pump with the same features and capacity as the Type "B," but only 20 inches long over all — tool-box size—with a 1½ inch barrel.



a carton of— Self-fluxing SOLDER

Here is a solder that every auto repairman or auto owner should have. It completely does away with any form of a separate flux.

Kester Acid-Core Wire Solder

It has the flux right in it in a core of cells or little pockets. As solder is melted off, flux is released, flows to the job and insures the user of a perfect bond.

Handy and Big Time Saver

KESTER ACID-CORE WIRE SOLDER is always ready to use and eliminates the bother of preparing a separate flux. Many hours per week can be saved in garages and repair shops by using this in preference to the ordinary solder.

Get it from your Supply House or mail Coupon to us for Free Sample

Sold in one pound cartons and on one, five and ten pound spools.

CHICAGO SOLDER COMPANY

MANUFACTURERS

218 N. Union Ave., Chicago, Ill.

Pacific Coast Distributors:

SIERRA ELECTRIC CO.

San Francisco, Cal.

FREE SAMPLE COUPON

M.A. 10-16-19

CHICAGO SOLDER CO.,

218 No. Union Ave., Chicago.

Gentlemen: Please send me a free sample of your
KESTER ACID-CORE WIRE SOLDER.

Name

Address

City State

Our Supply House is

Profits!

With A Bowser

Bowser Equipment make more profits because they sell more gasoline and oil.

Bowser Equipment sell more gasoline and oil because they are always accurate, always safe, always ready and always clean.

That's why Bowser Systems attract the trade. There is a Bowser System for your needs.

Write for a special booklet.

S. F. BOWSER & CO., Inc.
Fort Wayne, Ind., U. S. A.

Canadian Office and Factory, Toronto, Ont.



DOVER Electric Light Bulb Cases



Pat. Nov. 23, 1915

Carries 5 extra Lamps in a small seamless Steel Box, securely held in place by steel springs.



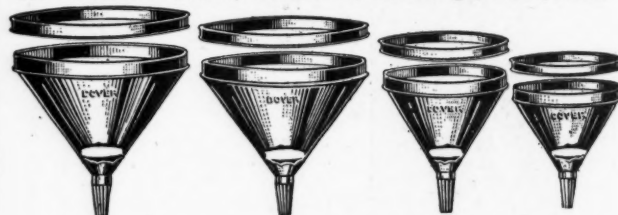
Pat. May 22, 1917

Carries 2 extra Lamps in a small steel cylindrical tube. Bulbs carried in either style of above cases guaranteed against breakage.

Send for Catalog.

DOVER STAMPING & MFG. CO.

385 Putnam Av., Cor. Pleasant St., Cambridge, Mass., U.S.A.



"Just What I Want"



Everyone says so at a glance, and when once installed in your Garage or Shop you would as soon think of keeping your front doors perpetually locked as doing without an

Automatic Extension Reel

For Electric Lamps

Take your lamp to any part of your Garage or Shop, locking and unlocking at any desired point. Automatically rewinds the cord when you are through with the light.

STRONG AND DURABLE. Send for full particulars and prices. Remember that it is not in any way a "half-baked" proposition nor an amateur outfit, but a splendidly constructed and practical piece of mechanism for men who haven't got time to bother with nonsensical makeshifts. Equipped with 25 feet packinghouse cord, handle, socket and lamp guard.

APPROVED BY THE UNDERWRITERS

The Cincinnati Specialty Manufacturing Company
INCORPORATED

Sole Manufacturers and Owners of Patents

1913 Powers Street CINCINNATI, OHIO

BRANCH OFFICES:

205 Abbott Building, Philadelphia 39-41 Cortlandt Street, New York
161 Massachusetts Avenue, Boston

Shop Equipment

which will net bigger profits for every dealer

EKERN Portable BENCH and ENGINE STAND



This outfit is especially designed for use in Ford repair shops. It is provided with two large tool and parts trays. The stand is mounted on three 4-inch diameter wheels. The rear castor wheel is so constructed that by pulling the plunger jim, the castor will swing up off of the floor and the stand will then rest firmly on its legs. Can be locked in any position or angle. The work Bench is also equipped with a machinist's vise, which has a 3-inch jaw with a 4-inch opening.

Our EKERN Motor Stand is similar to the work Bench, but is not equipped with trays or vise.

Our work Bench Motor Support is for holding Ford motors in any position and can be attached to any shop Bench.

The Axle attachment for holding axle assemblies of any make, is attachable to either the work Bench, Motor Stand, or Shop Bench Motor Support.

So that you may become better acquainted with the "money-making" advantages of our specialties, write for our Complete Catalog. Your jobber can fill your order.

H. G. Pare Co. 1412-1414 S. Michigan Ave.
CHICAGO, ILL.

May we send you this guide of Buffalo and Niagara Falls?

AN illustrated guide to points of interest in and around Buffalo and Niagara Falls. Free on request.

When in Buffalo, stop at the Hotel Lenox—Buffalo's ideal hotel for motorists. Quietly situated, yet convenient to theater, shopping and business districts and Niagara Falls Boulevard. First-class garage.

European plan. Fire-proof, modern. Unusual cuisine. Every room an outside room.

\$2.00 up.

On Empire Tours, Road map and running directions free.

C. A. MINER
Managing Director,
North St. at Delaware
Av., Buffalo, N. Y.



HOTEL LENOX

OLD SOL SPOTLIGHTS



"OLD SOL"

No. 76 Liberty Searchlight. Price \$5.50

Combined Push Button switch and focusing control in handle. Wing nut on bracket for inspection lamp. Double clamp bracket. Duplex wire to battery.

Three-inch mirror integral with lamp body, extra large silver plated reflector. Special high candle power bulb. Black enamel finish only.

Diameter of lamp front, 7 in. Weight, packed in 9½x6¾x6¾ carton, 4 lbs.

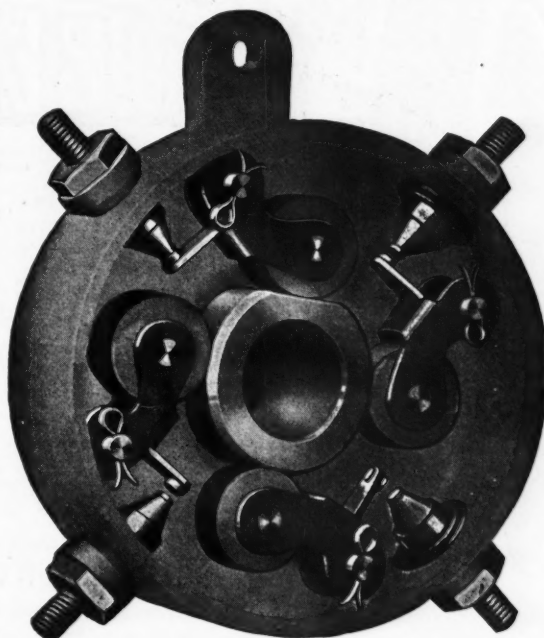
Made and Distributed by

THE HAWTHORNE CO.

Grassmere Avenue

BRIDGEPORT, CONN.

FIFTY THOUSAND MILES!



DUNTLEY MAGNETO BREAK TIMER

That's what you get from the Duntley Magneto Break Timer—50,000 miles of perfect ignition, with every timer trouble eliminated.

The Duntley is the most economical and nearest perfect timer ever made for Ford Car or Fordson Tractor. Here is what one man says—"The timer you sent . . . is all you claim for it. It certainly gives the Tractor **twice the power** it had before and also is a **saver of fuel.**"

The Duntley requires no lubrication. There are no sliding contacts. The positive make and break contact overcomes starting troubles, and insures correct timing on all four cylinders. Interchangeable on regular Ford Fittings.

SOLD ON AN ABSOLUTE MONEY-BACK GUARANTEE

Dealers: We have a mighty interesting proposition for you. Write for it.

J. W. DUNTLEY

1004 Michigan Ave.

CHICAGO, U. S. A.

TIRES

ECONOMY FOR MOTORISTS

TUBES



Slightly used and repaired tires and new tubes of the best known standard makes that mean big cash savings for every car owner.

Size	Tires	New Tubes	Size	Tires	New Tubes
30x3	5.00	1.70	34x4	8.75	2.80
30x3 1/2	6.00	2.10	34x4 1/2	9.25	3.15
32x3 1/2	6.50	2.25	35x4 1/2	9.50	3.25
31x4	7.25	2.50	36x4 1/2	9.75	3.30
32x4	8.00	2.60	35x5	10.50	3.65
33x4	8.75	2.70	37x5	11.00	3.75

For Non-skids add 10% to above prices

COMPLETE STOCK OF NEW TIRES

Write for Prices

Terms: \$1.00 deposit with each tire ordered, balance C. O. D. subject to inspection. Specify style of rim to avoid delay. Although at the above prices these tires bear no mileage guarantee, we will make reasonable adjustments should they prove unsatisfactory. All tires sent in for adjustment must be prepaid.

Special Proposition to Live Dealers

TIRE REPAIR & SUPPLY CO.

Dept. A, 1356 Michigan Ave., Chicago, Ill.
Phone Calumet 47-48-49

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The Engineering and Industrial Authority of the Automotive Field—Motor Cars, Trucks, Tractors, Airplanes. Read by Engineers, Production Managers, and other Executives of Automotive Manufacturing Companies.

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A Dealers' Journal, devoted principally to the *Distribution or Merchandising* of Automotive Products and Equipment. In conjunction with Motor Age covers nearly 90% of the principal Dealer field.

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A Dealers' Journal, devoted principally to the *Maintenance of Automotive Apparatus and Equipment*. In conjunction with Motor World, covers nearly 90% of the principal Dealer field.

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The oldest motor boat publication in the world. Read by Boat Owners, boat builders and supply dealers.

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The Oldest Truck publication in the United States. Read by Fleet Owners, their Traffic and Garage Managers. The logical medium for an advertiser who wishes to reach the real, important truck users.

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The only automotive export paper going exclusively to Dealers and other members of the Automotive Trade in Latin America.

TRANSFER & STORAGE

Reaches 75% of the purchasing power wielded by the Transfer & Storage Industry, Transportation Companies, Pool Car Distributors, Public Merchandise Warehouses. A wealthy and active field needing Trucks, Labor Saving Devices, Warehouse Equipment, etc.

THE TIRE RATE BOOK

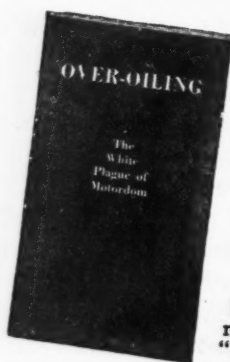
A quarterly publication containing special current information for Tire Dealers—price lists, types, sizes, etc. In constant use by practically all principal tire distributors.

THE CLASS JOURNAL COMPANY

CHICAGO
Philadelphia

NEW YORK
Cleveland
Detroit

Your Copy Is Ready



We shall be glad to send a copy of OVER-OILING on receipt of 5c in stamps.

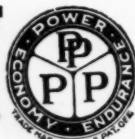
Our technical department has been making a careful study of OVER-OILING, its causes, effects, and cure. We have printed in an attractive brochure the results of their study. Repairmen and car-owners will find this brochure of immediate and immense value.

Over-Oiling

has been responsible for the great majority of motor troubles. This "White Plague of Motordom" has sapped the vitality and effectiveness of the motor without any apparent cure being found.

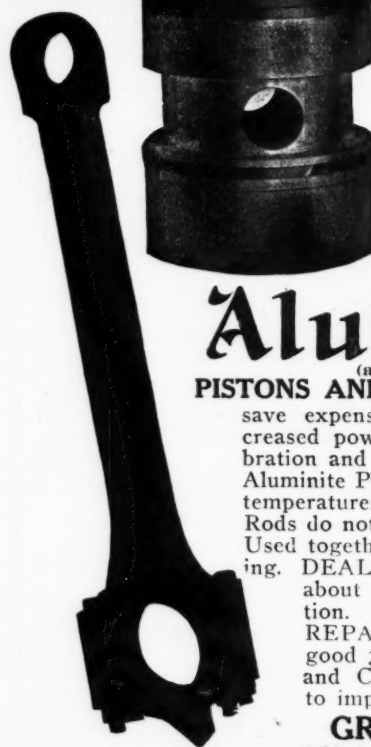
This booklet will tell you a definite and proven cure.

PRESSURE PROOF PISTON RING CO.



107 Massachusetts Ave., Boston, Mass.

LIGHT HARD STRONG



Heavy reciprocating parts pound crank pins out of round. Each running hour sees the car headed nearer to another overhauling. The lighter action of

Aluminite

(aluminum alloy)

PISTONS AND CONNECTING RODS

save expensive repair bills, afford increased power and speed, eliminate vibration and save gas.


Aluminite Pistons are unaffected by high temperatures. Aluminite Connecting Rods do not require crank pin bushings. Used together they affect a greater saving. DEALERS: We want to tell you about our merchandising proposition.

REPAIRMEN: Try to sell the good job first. Aluminite Pistons and Connecting Rods cannot fail to impress your customers.

GREEN ENG'R'G CO.

2-34 S. St. Clair St., Dayton, Ohio

for Cylinder Grinding See Our Ad in Clearing House Sec.



The AERMORE
Exhaust Horn

"The Signal With a Smile"

The pleasant, chime-like sound of The Aermore commands attention—and admiration, a block or a mile away.

Its clear penetrating tone rises in a distinct, vibrant chord, above the din of city traffic, and accomplishes the purpose for which it is intended without offense.

Constructed on the pipe organ principle of four, heavily nickled brass tubes, and operating from the engine exhaust, it is ready for service at every turn of the engine.

Requires no upkeep for it has no parts to wear out or break. It cannot clog and is good for many times the life of a car.

Ask for the right of way the right way.

No. 1	15 in. Aermore for cars of 30 H.	
	P. or over.....	Price \$9.00
No. 2	13 in. Aermore for cars of 25 H.	
	P.	8.00
No. 3	11 in. Aermore for Ford cars	7.00

Packed complete ready to easily install.
In ordering give diameter of Exhaust Pipe.

Manufactured by
THE FULTON CO.
MILWAUKEE WISCONSIN

KNEUTOP

PUTS NEW LIFE INTO OLD TOPS



The best \$1.25 you ever spent. One Quart will waterproof your top, and give the original sheen to Mohair.

For Leather and Imitation Leather it waterproofs and gives the original gloss and flexibility to the top.

PROTECT YOUR TOP

For Winter Driving
Easy to apply
Full directions on every can of KNEUTOP

Sent in mailable containers
\$3.25 per gal. \$1.75 per half-gal.
\$1.25 per qt.

Manufactured only by
The Western Reserve Varnish Co.
1251 Marquette St. Cleveland, Ohio



PACO

RACING BODIES

FORDS

PACO—The Distinctive Body

1919 Exclusive Points

PACO BODIES are back again. They have returned with new features after their withdrawal from sale while all of the nation's steel was being used against the Hun.

Make a snappy, fast and comfortable roadster out of the old Ford by putting on a PACO BODY. Modeled after world's greatest speedsters—long, sloping hood—streamline cowl—low seats and receding rear end—PACO BODIES offer least wind resistance. Designed on scientific engineering lines for speed and comfort.

FREE!!

3-color circular with illustrations from actual photographs of PACO BODIES mailed on request.

Write Today

Send for illustrations and prices of PACO BODIES. Do this today—get full description of these classy racing bodies.

PACO BODIES ARE EXCLUSIVE. We are patentees, sole owners and sole manufacturers of this type of racing body. All designs are fully covered by U. S. Patents granted Jan. 23rd and March 13th, 1917.

See the 1919 PACOS with the new Sport Top and Windshield, PACO exhaust, disk wheels and other features. Send for the FREE Circular. Order an exclusive—distinctive—PACO BODY.

PACO MFG. COMPANY, Dept. 5, PEORIA, ILL.

FAPCO

FORCE AIR PUMP

Feel the air escaping from an ordinary pump. Then try the Fapco. No air escapes—you pump all the air into the tire with the Fapco in less time with less work.

A Live Proposition for Jobbers and Dealers

The car owner wants it the moment he sees how it works. An intake valve at the top opens and closes with the movement of the piston rod. This traps all the air in the cylinder. So with every complete stroke all the air goes into the tire.

A leather cup in the piston gives perfect compression. Every Fapco has an expansion piston ring which reduces the chance of a leak and increases capacity.

Dealers—If your jobber can't supply you with Fapcos, write us.

Jobbers—Write for sample and terms.

FORCE AIR PUMP CO.
JEFFERSON, IOWA





Dealers! Garage Men! Repair Men!

Investigate the Le Bron Buffer and Power Plant. Air outfit connected if desired. 2, 3 and 5 H.P., any voltage; dust-proof and ball bearing motor.

USERS: This outfit will pay for itself immediately

Dealers: Get our liberal proposition
Write for prices and information
Le Bron Electrical Works
318 South 12th Street, OMAHA, NEBR.



Moore's Compensator

can be applied with perfect success on Buick, Oakland, Oldsmobile, Scripps-Booth and Chevrolet motors, reducing valve mechanism noises to a marked degree, giving to your motor a smooth, even tone.

When attached to upper part of valve stem reduces the noise in any overhead valve motor by equalizing the lost motion between the valve stem and the rocker arm.

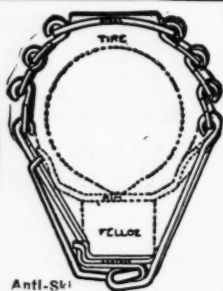
WM. H. BLODGETT, Distributor
DECATUR GEORGIA

Steel Tires & Mud Chains



NO MORE PUNCTURES
Try 2 or 3 sections over any old blowout. Can't have blowouts, punctures; neither can the rubber wear off.

Special prices to those in new territory
Kimball Tire Case Co., 173 Broadway,

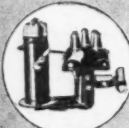


Anti-Ski
Mud chains can be put on in a jiffy with one hand while standing on the running board. Hook the ends together and push the little lever. If you get in a mud hole you will laugh out loud.

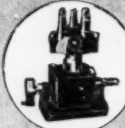
Council Bluffs, Ia.

ATWATER KENT

AUTOMOTIVE EQUIPMENT



Ignition,
Starting and Lighting



ATWATER KENT MFG. COMPANY Philadelphia



JORGENSEN VAPOR PRIMER

It Vaporizes the Starting Charge

Universally accepted the standard primer for motor trucks, tractors, passenger cars, airplanes and motor boats. The most perfectly constructed and most efficient primer on the market.

Write for free descriptive folder
JORGENSEN MFG. COMPANY
Waupaca, Wis.

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SERVICE STATION EQUIPMENT

Equipment and Supplies
for the

**MOTOR CAR—TRUCK—TRACTOR
MOTOR-BOAT—AEROPLANE**

Machine Shop—Garage—Vulcanizing Plant
OUTFITTERS

BECK & CORBITT

AUTOMOTIVE EQUIPMENT

First Street—Ashley to O'Fallon ST. LOUIS, MO.

FIRESTONE DEMOUNTABLE RIMS

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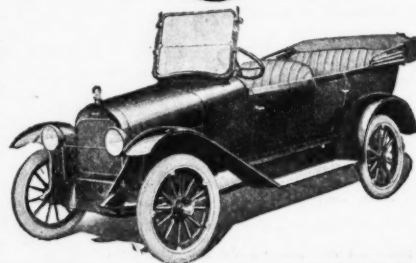


E. & W. TRUCK UNITS

Make A 1, 2 or 3 Ton Truck of Any Car
Furnished with either internal gear or worm drive, cab, body and unit complete are sold to fit any make car. Any wheelbase to 180 inches. 14 foot one-piece frame. We have an unusual and profitable proposition for dealers. Write for details.

E. & W. Mfg. Company,
400 Oregon St., Milwaukee, Wis.

M O R E

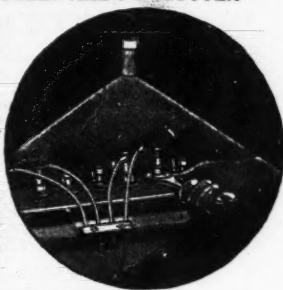


MOORE MOTOR VEHICLE COMPANY—Danville, Illinois

NIGHT TROUBLES ARE FORGOTTEN



"Stickalite" is a modern motoring convenience that turns night into day. Gives bright rays, second only to sunshine. Shows the light just where you want it and keeps it there. Has electro magnet in base. Sticks tight at any angle on iron or steel. Metal tube protects the bulb and prevents breaking. No "hand holding" necessary.



STICKS ANYWHERE

Uses standard bulb and connects to any light socket on car. Furnished complete to operate from either 6 or 12 volt with single or double contact connecting plugs. Specify when ordering.

From your Dealers or direct. Post Paid \$1.25

PREMIER ELECTRIC COMPANY

3803 Ravenswood Ave. CHICAGO, U. S. A.

A QUICK, PROFITABLE SELLER

Sta - Put Steering Stabilizer & LOCKING DEVICE FOR FORD CARS

Attached to lower end of steering column in 20 minutes (no holes to bore). Enables anyone to drive very steadily with perfect safety over sidings, graded roads, thru mud, sand or gravel. Prevents whiplash on steering wheel. Provides a good method of locking the car. Makes it impossible to upset car by cramping wheels. Guaranteed for life of car. Price \$10.00. Sold on 30 days' trial.

Write for dealer proposition

L. E. DUTTON

Palmyra, Nebr.

America's Aviators Used

BURD

High Compression

PISTON RINGS

The Standard of Efficiency

BURD HIGH COMPRESSION RING CO., Rockford, Ill.

1½, 2, 3½ and 5 Ton WORM DRIVE Models

Write for full information

SELDEN TRUCK CORPORATION

ROCHESTER, N. Y., U. S. A.

Selden Motor Trucks

Dyneto

STARTING LIGHTING SYSTEMS

THE DYNETO shows greatest efficiency in both motor and generator. Type D. A. Motor develops a torque of approximately 15 pounds. Type C. A. Generator shows approximately 15 amperes.

A car-speed of 15 to 20 M. P. H. keeps batteries fully charged.

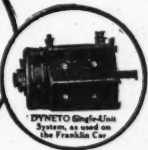
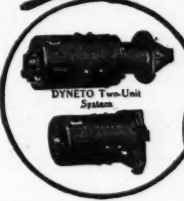
Starter always sure to start.

Lamps always bright.

Send drawings and specifications for our recommendation.

Special Outfits for Fords

DYNETO ELECTRIC CORPORATION, Syracuse, N. Y.

Guaranteed for 10,000 Miles
Brictson Pneumatic Tires

Every Brictson Tire is sold under a specific 10,000 mile written service guarantee. This guarantee is the longest and strongest ever put behind a pneumatic tire and is a positive protection to every purchaser. Brictson Tires are Puncture-Proof, and proof against blowouts, skidding, ruts, rim-cuts, oil and gasoline. Wonderful resiliency, easy riding qualities and economy commend them to every car owner.

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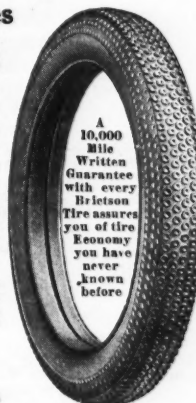
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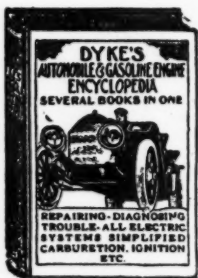
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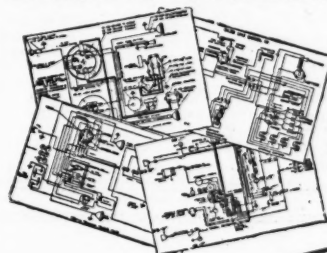
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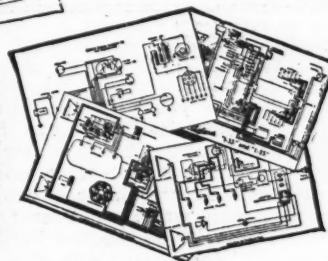
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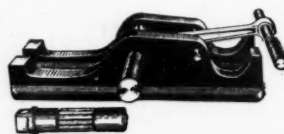
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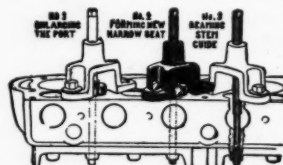
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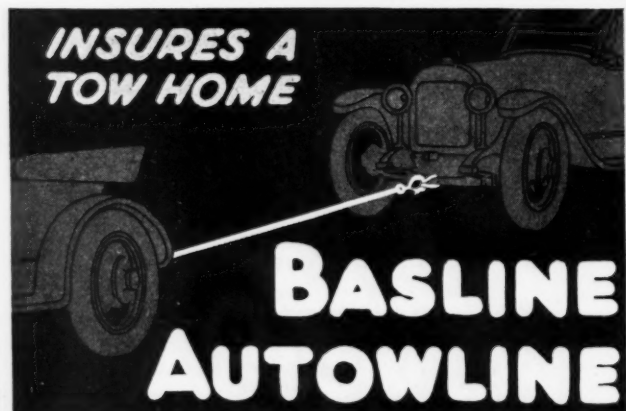
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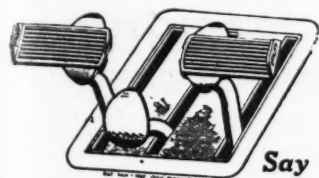
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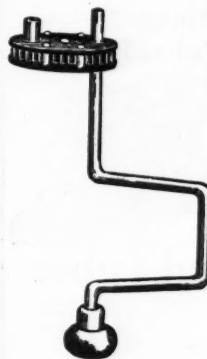
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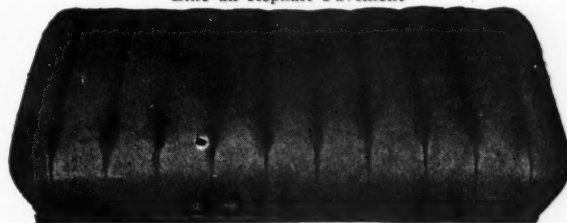
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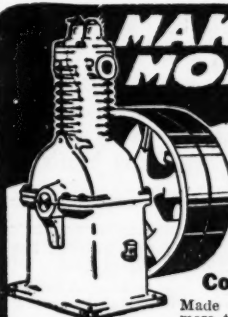
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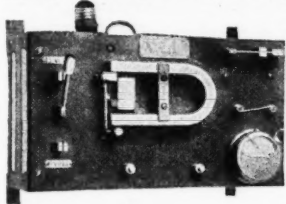
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The Motor Truck bought today without Electric Starting and Lighting will be out of date to-morrow

FORE RECTIFIER TYPE 2-B**Charges Battery at Cost of 5 to 15 Cents**

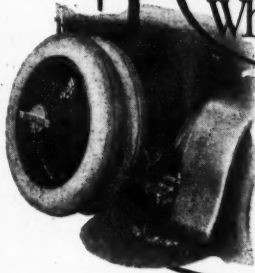
Will charge two 6-volt batteries at 6 ampere charging rate at one time or four 6-volt batteries at 3 ampere rate or one 12-volt battery at 6 ampere rate. Is self-starting and upon resumption of line current the charging is continued. Entirely safe to put battery on charge during the night. Battery can not be harmed by leaving it on over charge.



The efficiency of the Fore Rectifier is high so that the current consumed is very small. There is no maintenance expense or depreciation so that the cost per charge is simply for the current put into the battery.

Send for prices and illustrated literature.

Kentucky Electrical Co.
Owensboro, Kentucky

**Hub-Lock
Wheel Carrier**

Carries the wheel on a hub and keeps it locked secure from theft. Tire covers can be kept on—no chain or straps necessary. Fits any car. Specially adapted to Packard, Hudson, Cadillac, Buick and all cars using wire or disc wheels.

Dealers—Write for details.
Simplex Metal Products Co.
2357 Prairie Ave.,
Chicago, U. S. A.

The Soap That Cuts Grease

Packed in individual cartons, 100 to the case.



Long experimentation has developed the perfect mechanics soap, the name is

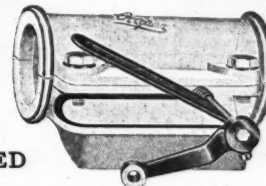
CHAUFFEURS

It instantly removes all grease and grime, the easy scientific and harmless way.

Our slogan
Not "Just as Good" but
"THE BEST"

Ask your dealer or send 10c for your first cake.

UNION CHEMICAL COMPANY
Decatur Illinois

*Cooper***"SPECIAL"
CUTOUT***"Feels the Pulse of the Car"***CORRECTLY
DESIGNED****QUALITY
GUARANTEED****EASILY
INSTALLED****FITS ANY
CAR**

THE COOPER MANUFACTURING COMPANY
Dept. A. Marshalltown, Iowa

Sales Managers—**THE FULTON COMPANY**
Dept. A. 1910 St. Paul Ave. Milwaukee, Wis.

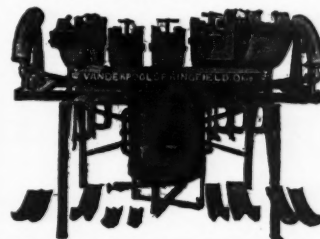
*Makers of Springs and Axles for Heavy Duty
Service for more than Fifty Years*



SHELDON AXLE & SPRING CO.
WILKES-BARRE : : : : PENNA.

COULD YOU HANDLE**\$100 A DAY?**

**REPAIR — REBUILD — RETREAD TIRES the
VANDERPOOL WAY. Profits 100% or more.**



Small investment. We are the pioneers in the manufacture of the DRY CURE vulcanizer, the vulcanizer that guarantees absolutely PERFECT work. Work easy to learn. If others have been successful, so can you be. Write today for full particulars.

In answering address Dept. N-18

WM. VANDERPOOL CO, Springfield, O.

**SCHEBLER
CARBURETOR***" Uniformly Dependable "*

The Wheeler-Schebler Carburetor Co. Inc.
Indianapolis Indiana

**OUR 3-G MOTOR GENERATOR
WILL MAKE YOU BIG PROFITS**

ANYONE can operate it. Reasonable in cost. Will make you more money with less time and labor, than any other department in your shop.

Our 3-G size charges from one to eight 6-volt batteries. Our 9-G size, one to twenty-four batteries.

Write for particulars. Already there are over 10,000 of our vibrating type Battery Chargers making big money for garage and repair men.

ST. LOUIS ELECTRICAL WORKS,
4067 Forest Park Boulevard
Saint Louis, - Missouri





Auto-Tyr
EXTINGUISHER

Best for Motor Car and Garage Protection.
Price \$2.50
Write for Dealer Proposition. Exclusive territory.

U. S. FIRE EXTINGUISHER CO.
Syracuse, N. Y. U. S. A.



HILL 3-A SPARK PLUGS

Dealers—You sell them on our guarantee that they cannot leak compression—short circuit, develop carbon, rust or break. This covers every good point a spark plug can have. Sell them and you sell satisfaction at a good round return for yourself. Price \$1.25 each. Write for the big story.

Hill Spark Plugs Make Good—or we do.



HILL INSULATING & MANUFACTURING CORP., 515 W. 42nd St., N. Y. City



ELCAR


Biggest Value
in
Popular Priced Field

Elkhart Carriage & Motor Car Co.
781 Beardsley Avenue
Elkhart, Indiana

BRISCOE

"Before you decide take a Briscoe ride" has become almost a rule among buyers of popular-priced cars.

BRISCOE MOTOR CORPORATION, Jackson Michigan
The Canadian Briscoe Motor Co., Limited, Brockville, Ontario



THE SAYERS SIX
"A Car of Rare Beauty"

Manufactured by
The Sayers & Scovill Co.
Established 1876
Cincinnati, Ohio


You Should Carry:—
The ZIP Spark Plug \$1

\$2.00

Safety Connection for Tire Pumps—
Set it at required pressure—the buzz of the escape valve tells you when to stop. Guaranteed accurate.

Its non-corrosive copper alloy shell will not "freeze" in cylinders or damage their threads.

The Hartley Screw Co., 132 Central Ave., Newark, N. J.
See ad next week—or in *MOTOR WORLD* this week. Liberal Discounts.



BELL


TIRE PUMPS, OIL AND GREASE GUNS

Jobbers and Dealers—Write for Catalog
The Bell Pump & Mfg. Co., Detroit, Mich.

TRED-WEL Tires **LAST-WEL TUBES**

If your trade is showing dissatisfaction with the tire you are selling and if you would like a better selling plan than you have, write to us. We have an attractive proposition on a moderate priced tire.

1002 Michigan Ave. **TWIN RUBBER CO.** Chicago, U. S. A.



"J. C. M." RADIUS RODS

You can depend upon J. C. M. Radius Rods to give years of service—put them on and forget about them. For the rods are inserted and clamped into a patented socket at the head end—not brazed or welded.

Dealers write for our special trade proposition on J. C. M. Radius Rods and J. C. M. Auxiliary Braces.

JERSEY CITY MACHINE CO.
115 Plymouth St. Jersey City, N. J.

ULTRA GLASS

absolutely impenetrable and non-scattering under direct impact or indirect concussion (e. g., door slam). Finer than the finest plate glass in appearance. Send today for a sample and our sales proposition.

Glass Founders Corporation **Milltown, N. J.**



Our Farm Lighting Proposition Will Interest You

Universal Farm Lighting and Power Units are the result of 20 years' production experience. Simple, efficient, satisfactory. The leading Farm Electrical System. Write for our sales plan.

UNIVERSAL PRODUCTS COMPANY
Sandusky, Ohio



EQUIPMENT FOR FORD CARS

Our 1920 catalog is now ready for you. Twenty-five items, all good sellers and big profit getters.

APCO MANUFACTURING CO. **Providence**

"ANYTHING AND EVERYTHING FOR AN AUTO"
TIMES SQUARE AUTO SUPPLY CO.
"World's Largest Auto Supply House"

Main Office, New York, N. Y., 1765 Broadway
We operate 27 direct branches in 23 leading cities
Send for our complete catalog



Starter Steel Ring Gears
For Fly-Wheels of All Cars

These steel bands, or ring gears, are to replace the cast iron teeth of the original fly-wheel. Send in your old fly-wheel and we will exchange or will put a band on yours. Or they can be put on in any machine shop that has a turning lathe.

Write for prices. Advise diameter and number of teeth.

KENT AUTO PARTS COMPANY
1743 Logan Street **DENVER, COLO.**

Two Money Makers
FOR FORD DEALERS AND JOBBERS

The DORIC **The EMCO**
Rolls-Royce Type Radiator Indestructible Radiator for Ford Trucks
for Ford Cars
"Permanently Beautiful" *Enormously Popular*
Better Cooling, Less Trouble, Longer Life. Write for Proposition
The MOTOR TRUCK RADIATOR & MFG. CO.
2-6 Columbus Circle, New York City

VIZ SPARK

Trade Mark Reg. U. S. Patent Office.

VISIBLE SPARK PLUG CO. **Pittsburgh, Pa.**

SEE PAGE 5



Joly--The Spark Plug with an Unsurpassed Air Record
Over 5,000,000 used by the Allied Air Forces. On duty for four years on every allied combat airplane. Now made in the United States for Truck, Tractor, Passenger Car, Gas and Airplane Engines. Unsurpassed in design, construction and endurance. Don't tie up on a spark plug contract till you get "Joly" facts and figures. A fast seller on reputation and performance. Write

LYONS IGNITION CO.
215-219 Fourth Ave., New York
Factory, Paterson, N. J.

A Few Live Dealers Wanted for MUTUAL

"America's Greatest Truck"

2-3½ and 5-ton, with Electric Light, Enclosed Cab, and Metal Wheels as part of regular equipment.

MUTUAL TRUCK CO.

Sullivan, Ind.

WATSON UNIVERSAL SERVICE TRAILERS

Save Expense

Add to your hauling capacity at minimum cost by getting a Watson Tractor-and-Trailer outfit. Quicker, stronger, cheaper, easier to handle.

Write for literature

WATSON PRODUCTS CORP.
Canastota, New York

BROWN-LIPE TRANSMISSIONS Factories & General Offices Syracuse N.Y. DIFFERENTIALS BROWN-LIPE-CHAPIN



**MAKE
A FRIEND
OF EVERY
OWNER**

DUESENBERG

Four cylinder Automobile Motor
is now being built and sold by

Rochester Motors Co., Inc.,

Rochester, N. Y.



USL
U.S. LIGHT & HEAT CORPORATION
storage batteries
machine-pasted plates



VALVE IN HEAD FOR FORDS

Dealers—Write
for full details today.

TRINDL SALES CORP.
60 E. 24th St. CHICAGO
Exclusive Distributors

Manufactured by
Racine Auto Equipment Co., Racine, Wis.

Should be regular equipment on **YOUR CAR**

KELLOGG
ENGINE DRIVEN
Tire Pump
KELLOGG MANUFACTURING CO. ROCHESTER NEW YORK

COE-STAPLEY

**Whirlwind
Tire Pump**

Your customers cannot afford less efficient accessories. To serve their best interest sell the Whirlwind Pump and Peteler Jack

**Peteler
AUTO JACK**

COE-STAPLEY MANUFACTURING CORP.
Sales Office, 136 Liberty St., New York. Factories: Bridgeport, Conn.



TABER

Tire Dressing Wheel

Equipped with removable blades having two wearing surfaces. Finest tool ever devised for removing dead rubber, for retread and half sole work. Price \$15.00. Extra blades \$3.00 per set.

Write for circular. Sold by all jobbers.

Manufactured by T. & T. Tire Dresser Co., San Francisco, California.

The HUFFMAN TRUCK

\$1495
With Internal
Gear Drive

\$1695 With Worm Drive
The Lowest Priced Truck in America for Its Carrying Capacity
HUFFMAN BROTHERS MOTOR CO.

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GREB AUTOMATIC GRIP PULLER

BEACH PATENT

There's no chance of this long-armed tool slipping—it grips the work like a vise, adjusting instantly—locking tight. Greb Arbor Press Base and Bench Plate attachment for Senior Puller give you \$110 equipment for less than one-third the amount. Dealers and Jobbers—Write for our liberal discounts and 10 days' trial proposition.

THE GREB CO., 305 State Street, Boston, Mass.



Akron-Williams TIRE REPAIR EQUIPMENT

Preferred and used by the largest tire factories in America. Consult us before remodeling or increasing your facilities.

THE WILLIAMS FOUNDRY & MACHINE CO.

Everything in Tire-Repair Machinery and Tools. Akron, Ohio

SERVICE-STATION

Install General Storage Battery Service

Under our ironclad twelve months guarantee, backed by the factory, the service station man is selling the **BEST BATTERY**—with solid assurance to rely upon. No adjustment—guarantees to make profits dwindle.

A Square Deal to Every Customer.

GENERAL STORAGE BATTERY CO., 2005 Locust St., St. Louis, Mo.
Full Line of Parts For All Makes of Storage Batteries.

IRONCLAD 12 MONTHS' GUARANTEE



MORTON W. SMITH CO., INC.19 West 44th,
New York, N. Y.

Announces that they are the sole distributors of the

PORTER MOTOR CAR*"Designed and Built by Men Who Know How"*

Designed by FINDLEY ROBERTSON PORTER

Built by THE AMERICAN AND BRITISH MFG. CO.

Chassis: \$6,500 F. O. B. Bridgeport, Conn.

Open Territory

Write for Particulars

factory rebuilt tires—

There is now developed a widespread demand among motorists for dependable rebuilt tires. The prices interest both tire users and dealers.

Send for quotations.

OVERLAND TIRE COMPANY

15-25 RIVER STREET

NEWARK, NEW JERSEY

**Thomas Timer Elevator**

Corrects Ford Ignition Troubles

The Thomas Timer Elevator corrects Ford Ignition Troubles—is comparable to the best ignition systems on the highest priced cars—and can be attached in twenty minutes. Dealers—Order from your Jobber.

THOMAS-ANDREWS CORPORATION

Chicago

Dept. of Sales, 624 S. Michigan Ave., Chicago

Factory, Waukegan, Ill.

Commerce TRUCKS*"For Business"*1-1½ and 1½-2 Ton
CAPACITIES**FULLY EQUIPPED**with impulse starter,
electric lights, wind-
shield and bumper.The Commerce Motor
Car Co.Mfrs. of Motor Trucks
DETROIT, MICHIGAN
9th Year**FEUMORT FIRE EXTINGUISHER**

—the new fire-fighting dry chemical guaranteed to extinguish a fire in less than two seconds. It is put up in one-fourth gallon handy metal cylinders which have the extinguishing power of 41 gallons of water.

Feumort has no pumps or valves to rust or corrode. Fits on any car or truck. \$5.00 each.

FEUMORT MFG. CO. INC.

160 Fifth Ave.

New York City

Standard Power
for
Automobiles
and Trucks**Continental Motors**

Detroit, Mich.

WESTERN**RUNS THE FORD ON KEROSENE**

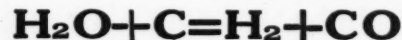
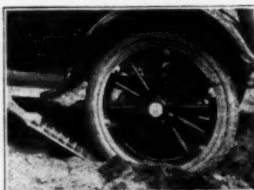
Dealers—Here is a new big seller with liberal profits that lead to more. Write for free literature and details.

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Alma, Michigan

AUTO LAD**3 in 1 Trouble Tool**

Prevents wheels spinning when car is stuck in mud, gravel, sand or snow. Forms perfect traction. Makes bad roads safe. Does not damage tires. Also used as shovel and as a firm foundation for a jack. Price \$1.50. Order a sample and details of our dealer proposition.

ALSTEEL MFG. CO.,
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Save 25% to 40% of Gasoline

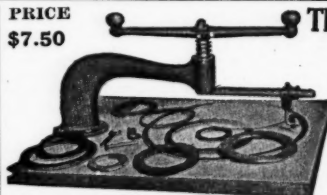
WRITE US ABOUT IT

AUTOMATIC STEAM CARBURETOR CO.

2490 Milwaukee Avenue, Belmont 7932, CHICAGO

PRICE

\$7.50

**The Springfield Circle Cutter**

FOR CUTTING

Lamp Glass, Sheet Copper
and Rubber Gaskets, Felt
and Fiber Washers, Etc.Capacity any size circle from 0 to 14 in.
Positive measuring scale to determine
sizes. Manufactured by**THE SHAWVER COMPANY**

220 Winter St., Springfield, Ohio

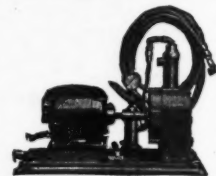
The "Long Stroke"

COMPRESSOR

(Write for descriptive folder)

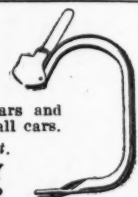
MOTOR-COMPRESSOR CO.

52-60 Dickerson Street, Newark, N. J.

**BEARDSLEY NEVER-SLIP VALVE LIFTER**

Three popular priced types—for Ford cars, for Dodge cars and Fordson tractors, and a Universal which fits 90 per cent of all cars.

Literature and dealer's proposition sent on request.

THE LOOMIS-BEARDSLEY MFG. COMPANY
1120 Mt. Vernon Ave.
Columbus, Ohio**DISTRIBUTORS WANTED FOR**Guaranteed
for the life
of the car**Laurson**
HYDRAULIC GEAR SHIFTEVERYONE
WANTS
IT

U. S. AUTO GEAR SHIFT CO., 122 S. Michigan Ave., Chicago

**STANDARD RADIATOR**

Make big money selling this 2½ in. brass core radiator. Interchangeable with regular Ford, fits Ford shell. Retail Price complete \$21.00. Less shell \$19.50.

STANDARD RADIATOR CO., Inc.
SPRINGVILLE, NEW YORK**Cletrac****TANK-TYPE TRACTOR**

Offers an almost unlimited opportunity for dealers

Write for catalog and dealer proposition

The Cleveland Tractor Co., Cleveland, O., U. S. A.**KINGSTON CARBURETORS**

THE CLEARING HOUSE

OF THE MOTOR INDUSTRY

FOR PARTS, ACCESSORIES, TIRES, MACHINERY, REBUILDING, REPAIRING, WELDING AND USED CARS. ALSO HELP AND SITUATIONS WANTED AND MISCELLANEOUS CLASSIFIED ADVERTISING.

Wire-Write-or Come to Warshawsky— Headquarters for Auto Parts

Every Used Part Is in First Class Condition, and Will Render Satisfactory Service. If We Cannot Satisfy You, Your Money Will Be Cheerfully Refunded

SPECIAL MOTOR BARGAINS

All in Excellent Condition
UNIT POWER PLANTS

1 New Keystone 6 cyl.	\$200.00
1 Stearns Knight 4 cyl.	150.00
1 Stoddard Knight 6 cyl.	200.00
1 Hershoff Spillman 6 cyl.	175.00
1 Continental 6 cyl. with starter	150.00
1 Hershoff Spillman 4 cyl.	150.00
1 Model engine 4 cyl.	125.00
1 Jackson 4 cyl.	150.00
1 Haynes 4 cyl.	125.00
1 Allan 40 4 cyl. with gen.	125.00
2 Continentals 4 cyl. with magneto	175.00
2 Lozier 4 cyl.	100.00
1 Wisconsin Out of Cutting 4 cyl.	100.00
1 Menominee 4 cyl.	100.00
1 Rutenber 4 cyl.	100.00
2 Master 6 Chalmers 6 cyl.	125.00
1 Knox 6 cyl.	175.00
1 Haynes 6 cyl. with starter and generator	175.00
1 Patterson Northway 4 cyl.	125.00

MOTORS—ONLY

1 New Caille 8 cyl with starter, gen. and carb.	\$250.00
1 Hudson 6 cyl. 6-54	125.00
1 Velle 6 cyl.	125.00
1 Peerless 6 cyl.	125.00
1 Premier 6 cyl.	100.00
1 Pierce 6-36 6 cyl.	120.00
1 Pierce 6-48 6 cyl.	135.00
1 National en-bloc	135.00
1 Northway 6 from Cole with centre control, starter and generator	150.00
1 Northway 6 from Oldsmobile with starter and generator.	135.00
1 Rutenber 6 cyl.	125.00
1 Continental with starter.	125.00
1 Rutenber 6 out of Auburn.	125.00
2 Mitchell T Head 6 cyl.	125.00
2 Alco 6 1/2 Ton Truck.	150.00
1 Peerless 6 cyl.	150.00
2 Studebaker 4 cyl.	90.00
5 Continental E 4 cyl.	100.00
5 Continental C 4 cyl.	100.00
1 Continental C 4 cyl. with starter	100.00
1 Continental R 4 cyl.	100.00
1 Continental P 4 cyl.	100.00
1 Northway 4 cyl.	85.00
1 1914 Cadillac 4 cyl. with starter and generator.	125.00
1 1913 Cadillac 4 cyl.	100.00
1 1912 Cadillac 4 cyl.	190.00
1 Stoddard Dayton 4 cyl.	100.00
2 Packard 18 4 cyl.	125.00
1 Overland 83 en-bloc.	100.00
1 Overland 69	85.00
1 Overland 79	95.00
3 Ford	75.00
1 Buick Truck	85.00
1 Atlas	75.00
1 Blitzen Benz	100.00
1 Marlon Stutz New 4 cyl.	125.00
1 Marlon Stutz 4 cyl.	100.00

We Buy
**BOSCH
MAGNETOS**
Hair and Leather in
Any Quantity

10 Duda 4 cyl.	90.00
1 Alco 4 cyl.	75.00
3 Wisconsin 4 cyl.	125.00
2 Mitchell 1913 T Head 4 cyl.	100.00
1 Knox 4 cyl.	100.00
1 Reo 4 cyl.	75.00
1 Staver 4 cyl.	90.00
1 National 4 cyl.	125.00
1 Cadillac Marine 4 cyl.	100.00
1 Commerce 4 cyl.	75.00
1 Renault 4 cyl.	90.00
3 ECH 4 cyl.	60.00
1 Premier 4 cyl.	100.00

MAGNETOS	
Overhauled and Guaranteed	
New DU4 Variable	\$35.00
DU4 Bosch Set Spark	25.00
DU4 Bosch Variable Spark	27.50
DU6 Bosch	32.50
DR4 Bosch	20.00
DR4 Bosch 2 spark	65.00
DR6 Bosch	25.00
DR6 Bosch 2 spark	75.00
D4 Bosch	15.00
D6 Bosch	17.50
D6 Bosch 2 spark	\$45.00

NU4 Bosch	15.00
ZR6 Bosch	50.00
ZR4 Bosch 2 spark	100.00
Eisenmann Duo	15.00
Remy Model RL & D.	7.00
Dixie Mags.	12.00
New Dixie Mags. 4 cyl.	18.00
New Sinus H T.	18.00
Mea	12.00
New Splittorf Type E.	12.00

COILS

Bosch Type A	\$7.50
Bosch Duplex	4.00
Eisenmann	4.00
Splittorf	4.00
Silent Starter and Generator Chains; all lengths and sizes	

New 8-cyl. Delco distributors. 12.00

MOTOR GENERATORS

Wagner 13 Studebaker	25.00
Jesco	25.00
20 Delco	30.00
Gray & Davis 2 Unit	35.00
Westinghouse S W 1158 A.	30.00
New Remy Model 130B 6 volt Starter and Generator	60.00
Remy 5, 6, 3, SJ2, 535	35.00
Disco 16 E-12 volt	35.00
Apple Mod 28 A	25.00
Inta Chalmers	35.00
Northeast	20.00
Apple—A28 for Mitchell	25.00

GENERATORS

New Remy Generators (Round Type) with relay	18.00
Westinghouse with distributor	
230-221	25.00
Leeco-Neville, 12 volt	16.50
Northwestern	10.00
Autolite	10.00-15.00
New Westinghouse 209 B.	20.00
Gray Davis G. G. I. C.	15.00
Ward Leonard AG T.	10.00-12.00
Splittorf	12.00
Vesta	12.00
Berdon	10.00
Delco Oakland	10.00
Bijur Series 51-30-5.	15.00
Ward Leonard for King.	15.00
Rushmore No. 1.	15.00

STARTERS

Bijur Apperson	25.00
Allis Chalmers	35.00
Remy 182	20.00
Packard	20.00
Deaco	20.00
Starter for Palmer Singer.	20.00
Westinghouse 533-S W 103.	25.00
Allis Chalmers	15.00
Wagner for King.	20.00
Autolite No. 7049-2407-6145	15.00-20.00
Autolite for Abbott.	15.00
Gray Davis Chalmers	20.00
Leeco-Neville Haynes	20.00
Gray Davis, Lozier and others.	30.00
Autolite, Overland 79, 81, 82.	15.00-20.00

SECOND-HAND CAR DEPT.

\$150.00 to \$550.00
50 to 75 exceptionally good used cars at prices so low that they would even interest dealers.

SPEEDOMETER HEADS

Stewart or Warner	\$1.50 to \$4.00
New Stewart with 36-in. shaft.	6.00
Pyrene Fire Extinguishers	6.00

DEPOSIT REQUIRED
WITH
ALL ORDERS

BARGAINS IN NEW PARTS AND MATERIAL COMPLETE LINE OF NEW PARTS For 13-14-15 Velle & Stoddard Dayton Cars

New 1 and 1 1/2 ton truck bodies	60.00
New Hartford shock absorbers with fittings, set of four	12.00
New Autolite ammeters, 20 amp. \$1.50; 30 amp.	2.00
New One-Man Top Wind-shields	8.00
Connecticut 3-button switches	1.75
National Standard Medium Jacks	1.50
Heavy Grease Guns	.50
14,000 ft. new radiator hose. Price per ft., 1-in., 15c; 1 1/4-in., 17 1/2c; 1 1/2-in., 20c; 1 3/4-in., 22c; 2-in., 25c.	

NEW & USED GEARS & BEARINGS

New Bailey Differentials for Overland Models, 80, 81, 83. \$10.00

PREST-O-LITE TANKS

Model B. \$5.00 each; E. \$3.50 each

Searchlight Tanks \$2.50

New 4-Passenger Roadster Tops, complete. \$35.00

NEW WIRE WHEELS FOR FORDS

Set of 4 wheels and 5 rims, \$45.00. \$5.00 allowance for old wheels. Demountable Rims for your Ford Wheels 30x3 1/2—Set of 5 with 4 filler bands \$8.50.

NEW SOLID TRUCK TIRES

at Exceptionally Low Prices

NEW TIRES—5000 Mile Guarantee

Size	Ribbed Tread	Non-Skid	Size	Ribbed Tread	Non-Skid
30x3	\$10.00	\$10.00	34x4	\$21.00	\$22.50
30x3 1/2	12.50	12.50	34x4 1/2	21.00	22.50
31x3 1/2	12.50	12.50	34x4 1/2	25.00	27.50
32x3 1/2	\$15.00	16.00	35x4 1/2	27.50	30.00
31x4	20.00	20.00	35x5	30.00	32.50
32x4	17.50	18.50	37x5	32.50	35.00
33x4	20.00	21.00			

10% Deposit Required with each tire ordered
Balance C. O. D. subject to examination

30x3	\$1.75	34x4	\$3.00
30x3 1/2	2.00	36x4	3.50
32x3 1/2	2.25	35x4 1/2	3.25
32x4	2.50	36x4 1/2	3.50
33x4	3.00	37x4 1/2	3.75

GOOD USED TIRES AND TUBES OBTAINED FROM WRECKED CARS

WRITE FOR PRICES

MAIL ORDERS SHIPPED SAME DAY

HIGHEST PRICES PAID FOR WRECKED CARS

WARSHAWSKY & CO.

LARGEST CAR WRECKERS IN THE WORLD

1915 SOUTH STATE STREET

PHONE CALUMET 7315

CHICAGO, U. S. A.

Parts and Repairs

Parts and Repairs

Parts and Repairs

PARTS FOR ALL CARS

We Save You 50 to 80% of the Original Cost

Satisfaction or
Your Money Back

New Spotlights, 5 in. lens with
mirror \$3.48

Prest-O-Lite Tanks

Model B.....\$4.00 ea.
Model E.....3.00 ea.
Searchlite Tanks 2.00 ea.

COILS

Bosch Type A.....\$6.50
Eisemann.....3.50
Splitdorf.....3.50

STARTERS

Gray & Davis.....\$14.00
Auto Lite, Bendix Drive.....17.50
Jones Starter and Generator.....20.00

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Remy.....12.00
Vesta.....10.00
Silent Starter and Generator
Chains, all lengths and sizes.
Lighting and Starting Batteries
.....\$6.00 to \$15.00
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Magnetos Overhauled and Guaranteed

Bosch DU4 Variable.....\$27.50	Bosch DR4.....\$19.50	Bosch D6.....\$15.00
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New Bosch DU4 Variable.....35.00	Bosch ZR6.....35.00	Remy.....6.00
Bosch DU6.....29.00	New Bosch ZR6.....40.00	Dixie.....12.00
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OUR SLIGHTLY USED Tires and Tubes

OBTAINED from WRECKED CARS
Mean Economy to You—A Trial
Will Convince You

Size	Tires	Tubes
30x3	\$4.50	\$1.35
30x3 1/2	5.50	1.45
31x3 1/2	5.75	1.50
32x5 1/2	6.00	1.50
34x3 1/2	6.50	1.60
31x4	7.00	1.65
32x4	7.75	1.60
23x4	8.50	1.70
33x4 1/2	9.00	1.75
34x4	8.50	1.70
35x4	9.00	1.75
34x4 1/2	9.00	1.75
35x4 1/2	9.25	1.80
36x4 1/2	9.50	1.85
38x4 1/2	15.00	2.50
40x4 1/2	15.00	2.50
42x4 1/2	25.00	4.00
35x5	10.25	2.90
36x5	10.25	2.90
27x5	10.75	2.20
38x5 1/2	15.00	2.34x 1/2
40x4 Non Skid	15.00	31x4 1/2
43x4 1/2 Cl. Non Skid	15.00	35x4 1/2

Express Must Be Prepaid on Old Tires Sent to Us.

Special New Clincher Tires

32x4.....\$10.00 33x4 1/2.....\$12.50 34x5.....\$12.50

Double Tread Tires

Selected from best used material obtainable.
Retainers Free with Each Tire

Two tires, one with good top and other with good sidewalls are trimmed, cemented and sewed firmly together by Campbell lock stitch method, twelve to fourteen plies fabric making puncture and blowout almost impossible.

Size	Complete tire	You furnish one tire	You furnish both
28x3	\$4.15	\$3.00	\$1.50
30x3	4.75	3.35	1.50
30x3 1/2	5.80	4.25	2.00
31x3 1/2	6.50	4.50	2.00
32x3 1/2	6.75	5.25	2.00
34x3 1/2	7.00	5.60	2.25
31x4	6.95	5.75	2.50
32x4	7.15	5.65	2.50
33x4	7.80	6.25	2.50
34x4	8.00	6.45	2.50
35x4	8.75	7.15	2.50
36x4	9.40	7.50	2.50
33x4 1/2	9.25	7.60	3.00
31x4 1/2	9.65	8.00	3.00
35x4 1/2	10.15	8.20	3.00

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All Cars

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Guaranteed for 6 Months
6 Volt Starting and Lighting
Batteries.....\$13.50
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Batteries.....18.50

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4 cyl. Everett 30.....45.00
4 cyl. Davis 30.....50.00
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Overland 83A with starter and generator.....100.00
Overland 83B block motor with starter and gen.....90.00

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Continental, Model E.....\$115.00
Chalmers 30.....65.00
Rutenber Cyl.....80.00
Radiators.....\$10.00 and up
Speedometer Heads.....\$1.00 to \$3.00
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Front Axles.....2.50
Rear Axles.....2.25
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Moon 1913.....75.00
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Overland 69.....50.00
Overland 81.....75.00
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Nylberg 6.....75.00
Crow-Elkhart, Lycoming
D U X.....125.00
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Elgin 6 Falls Motor.....125.00

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Starter & Generator.....150.00
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33x4 rib	21.60	36x4 1/2 N. S.	33.91
33x4 N. S.	22.20	37x5 rib	38.62
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Mail orders filled promptly. Cash with order or 25 per cent deposit,
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Etc. Sell Double Tread Tires. Our quality and prices will make money for you.

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Tires

Tires

Tires

TIRES & TUBES

SLIGHTLY USED AND FACTORY REPAIRED
TIRES AND NEW TUBES—QUALITY ABOVE ALL

The **QUALITY** of our tires and tubes is superlative, the **PRICE** cannot be equaled and our **SERVICE** cannot be excelled

**A SATISFIED CUSTOMER IS OUR BIGGEST ASSET, THEREFORE
WE MUST SATISFY YOU**

Size	Used Tire	New Tube	Size	Used Tire	New Tube	Size	Used Tire	New Tube
30x3	\$4.00	\$1.95	32x4	\$7.25	\$3.05	35x4½	\$8.75	\$4.25
30x3½	5.00	2.30	33x4	8.00	3.25	36x4½	9.00	4.40
32x3½	5.50	2.40	34x4	8.00	3.40	35x5	9.75	4.60
34x3½	6.00	2.60	35x4	8.25	3.50	36x5	9.75	4.70
31x4	6.50	3.00	34x4½	8.50	4.15	37x5	10.00	4.75

Send \$1.00 deposit with each tire ordered. Tires will be sent promptly, with privilege of examination, and balance C. O. D. Specify style of rim to avoid delay.

Our Used Tires are not guaranteed for any definite number of miles, but we will make reasonable adjustments on all tires that do not give service in proportion to the price paid, providing tires are returned to us by prepaid express. Is not this fair enough?

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America's Best Make SECONDS

Surplus and Obsolete Stocks

Our Prices Will Interest You
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NEW, USED AND
DOUBLE TREAD

NEW TIRES
NEW, FRESH STOCK
Exceptional Bargains

Size	Tires	Tubes	Size	Tires	Tubes
28x3	\$ 8.60	\$1.85	35x4	\$20.60	\$3.50
30x3	8.35	1.80	33x4½	23.60	3.75
30x3½	10.80	2.20	34x4½	24.40	3.90
32x3½	12.70	2.30	35x4½	25.50	4.05
34x3½	14.80	2.70	36x4½	25.90	4.60
31x4	16.65	2.85	35x5	29.10	4.90
32x4	16.95	2.90	36x5	29.90	4.75
33x4	17.70	3.00	37x5	30.75	4.90
34x4	18.10	3.10			

ADD 10% FOR NON-SKID

**SLIGHTLY USED TIRES
OBTAINED FROM WRECKED CARS AND
FACTORY REPAIRED**

Size	Tires	Tubes	Size	Tires	Tubes
30x3	\$ 4.50	\$1.35	34x4½	9.00	1.75
30x3½	5.50	1.45	35x4½	9.25	1.80
32x3½	6.00	1.50	36x4½	9.50	1.85
31x4	7.00	1.65	38x4½	15.00	2.50
32x4	7.75	1.60	40x4½	15.00	
33x4	8.50	1.70	42x4½	25.00	4.00
34x4	8.50	1.70	35x5	10.25	2.00
35x4	9.00	1.75	36x5	10.25	2.00
33x4½	9.00	1.75	37x5	10.75	2.20
			38x5½	15.00	

DOUBLE TREAD TIRES

Selected from best used material obtainable.

RELINERS FREE

Two tires, one with good top and other with good sidewalls are trimmed, cemented and sewed firmly together by Campbell lock stitch method, twelve to fourteen plies fabric making puncture and blowout almost impossible.

Size	Complete tire	You furnish one tire	You furnish both
28x3	\$ 4.15	\$ 3.00	\$ 1.50
30x3	4.60	3.35	1.50
30x3½	5.30	4.25	2.00
31x3½	6.50	4.50	2.00
32x3½	6.75	5.25	2.00
34x3½	7.00	5.60	2.25
31x4	6.95	5.75	2.50
32x4	7.15	5.65	2.50
33x4	7.80	6.25	2.50
34x4	8.00	6.45	2.50
35x4	8.75	7.15	2.50
36x4	9.40	7.50	2.50
33x4½	9.25	7.60	3.00
34x4½	9.65	8.00	3.00
35x4½	10.15	8.20	3.00

Express Must Be Prepaid on Old Tires Sent to Us

\$1.00 Deposit Required With Each Tire Ordered, Balance C. O. D., Subject to Examination. Specify Style of Rim.

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TIRES

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Guaranteed for One Year

OUR PRICES

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30x3	\$9.12		\$2.00
30x3½	11.76	\$12.39	2.45
32x3½	13.89	14.55	2.55
31x4	18.15	19.05	3.20
32x4	18.48	19.38	3.35
33x4	19.20	20.22	3.45
34x4	19.77	20.73	3.55
35x4½	27.84	29.16	4.45

10% deposit required with order, balance C. O. D., subject to examination. Special proposition to dealers.

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ALWAYS A CUSTOMER" is our motto. We are also
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Special attention given to Trucks and Tractors.

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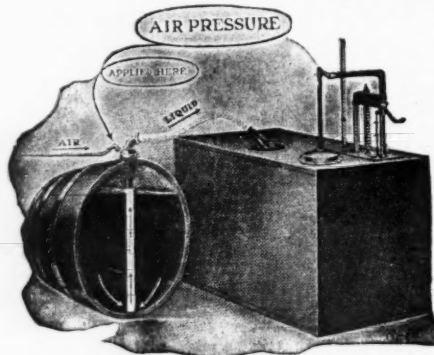
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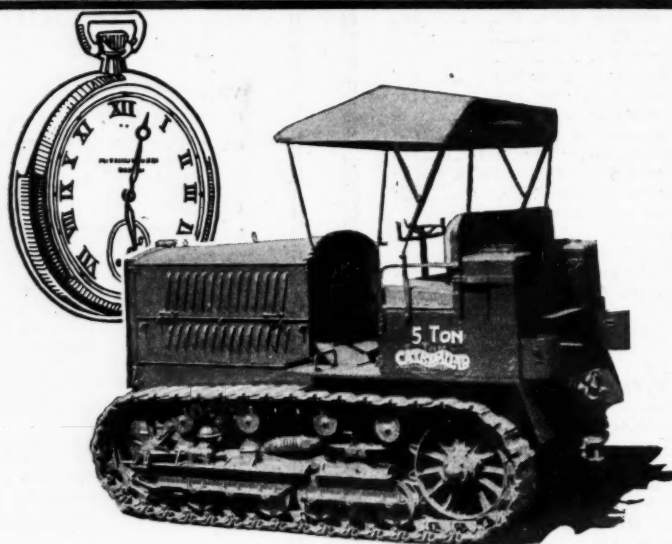
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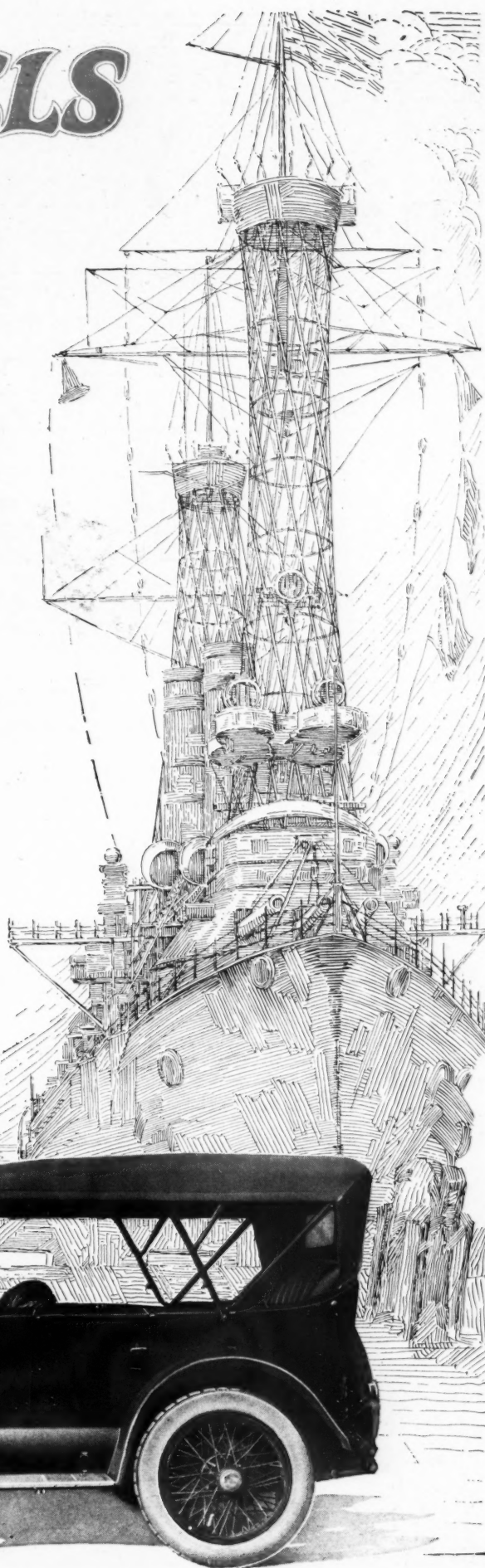
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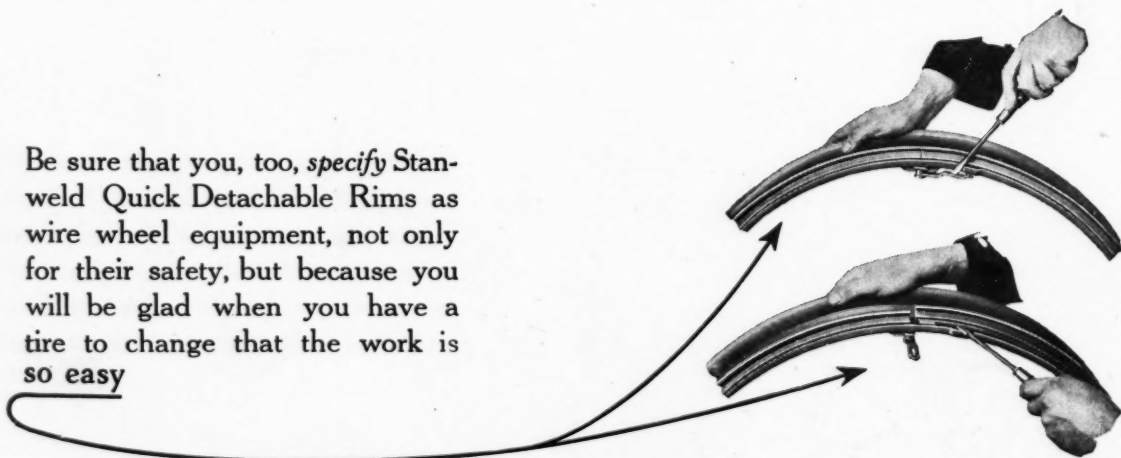
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